



SPECIAL
REPORT

Fifth in a series on
individual roads

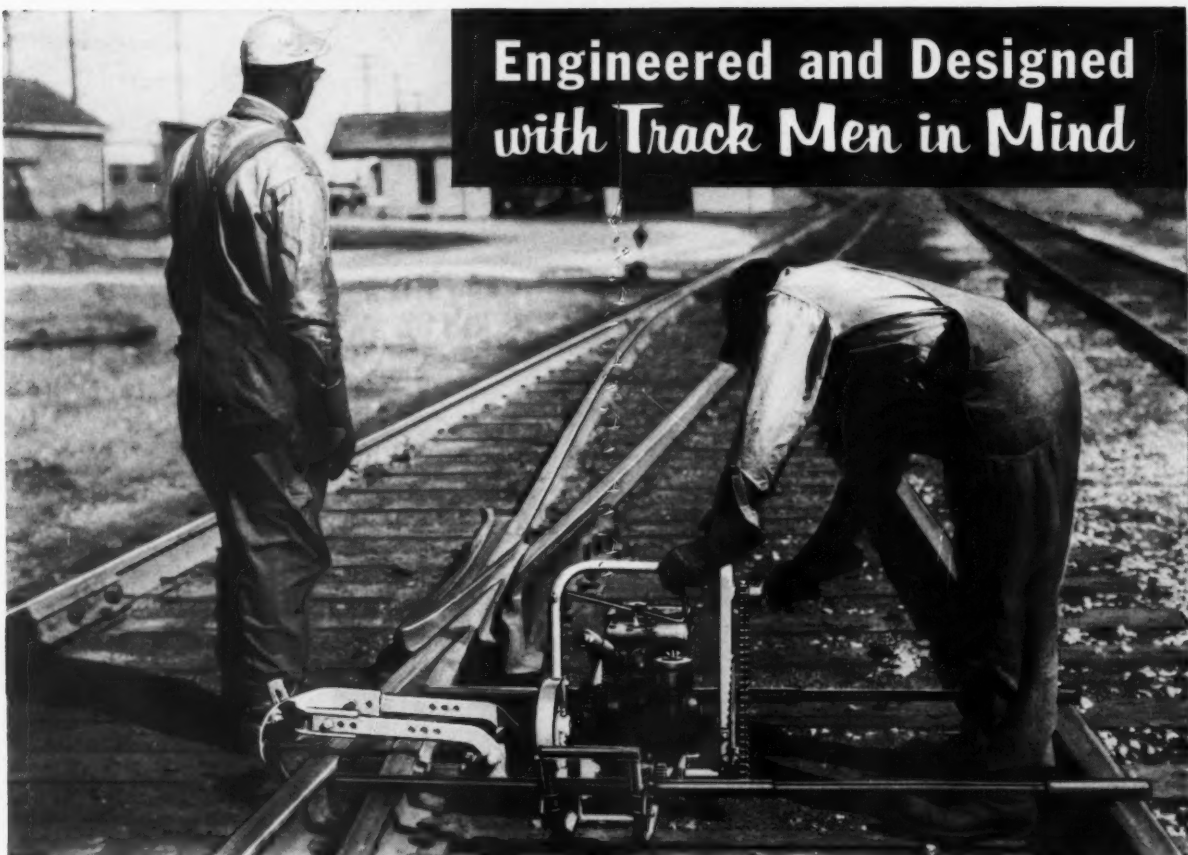
PANORAMA  OF PROGRESS

way **TRACK** and

STRUCTURES

January 1961

A Simmons-Boardman TIME-SAVER Publication



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RAILWAY TRACK and STRUCTURES

JANUARY, 1961

3

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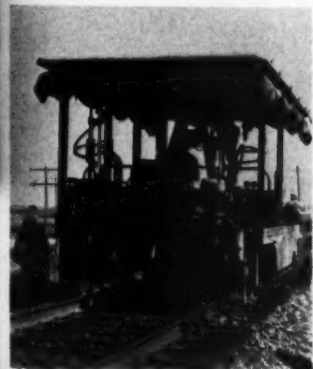
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RAILWAY TRACK and STRUCTURES

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◀ Don't miss . . .

One of the GN's small mechanized smoothing gangs was equipped with some new machines for the 1960 working season. Output of the gang during the season ranged from 2500 to 2700 ft per day.

. . . in the February issue

Fairmont

SNOW MELTER

and

WEED BURNER

Double-duty "flame thrower" pays its own way in year 'round savings!

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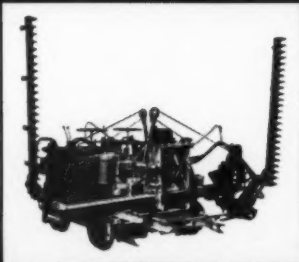
As a weed burner, the Fairmont W55 spreads its hot, thick uniform flame—approximately 2,500° F.—to burn a width of 25 feet in one trip. Each of the five open-flame-type heads is equipped with three atomizing nozzles for maximum penetration and killing effect. A three-speed mechanical drive plus a torque converter meet the speed requirements of all burning conditions.

Plan now to include these versatile Fairmont W55's in your budget to handle both your winter and summer requirements. Call or write for full details.

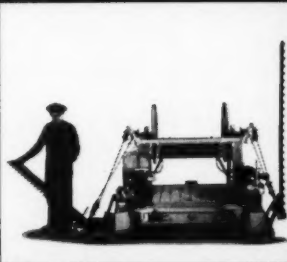
FAIRMONT equipment is available for lease.



W7B SERIES B WEED SPRAYER. High quality, low-cost unit for branch lines, yard tracks. Easy to operate.



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Fairmont, Minnesota

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NOW YOU CAN HAVE “RIBBONRAIL” welded rail delivered right to trackside from the mill. No capital outlay . . . no operating problems . . . no skilled personnel taken from other jobs. Rail arrives ready to be laid.

LINDE fixed rail welding plants are in operation at Harrisburg, Pennsylvania, near the Steelton Mill of Bethlehem Steel Company; and adjacent to the Tennessee Coal and Iron Division of United States Steel, at Birmingham, Alabama. Additional plants will soon follow. These plants will employ the famous “RIBBONRAIL” process of oxy-acetylene pressure welding—recognized for over twenty years as the top quality rail welding process—and used by over forty major railroads. For a single, predictable contract price, you can get rail welded in the lengths you need, and as you

need them. Facilities will also accommodate the welding of relayer rail.

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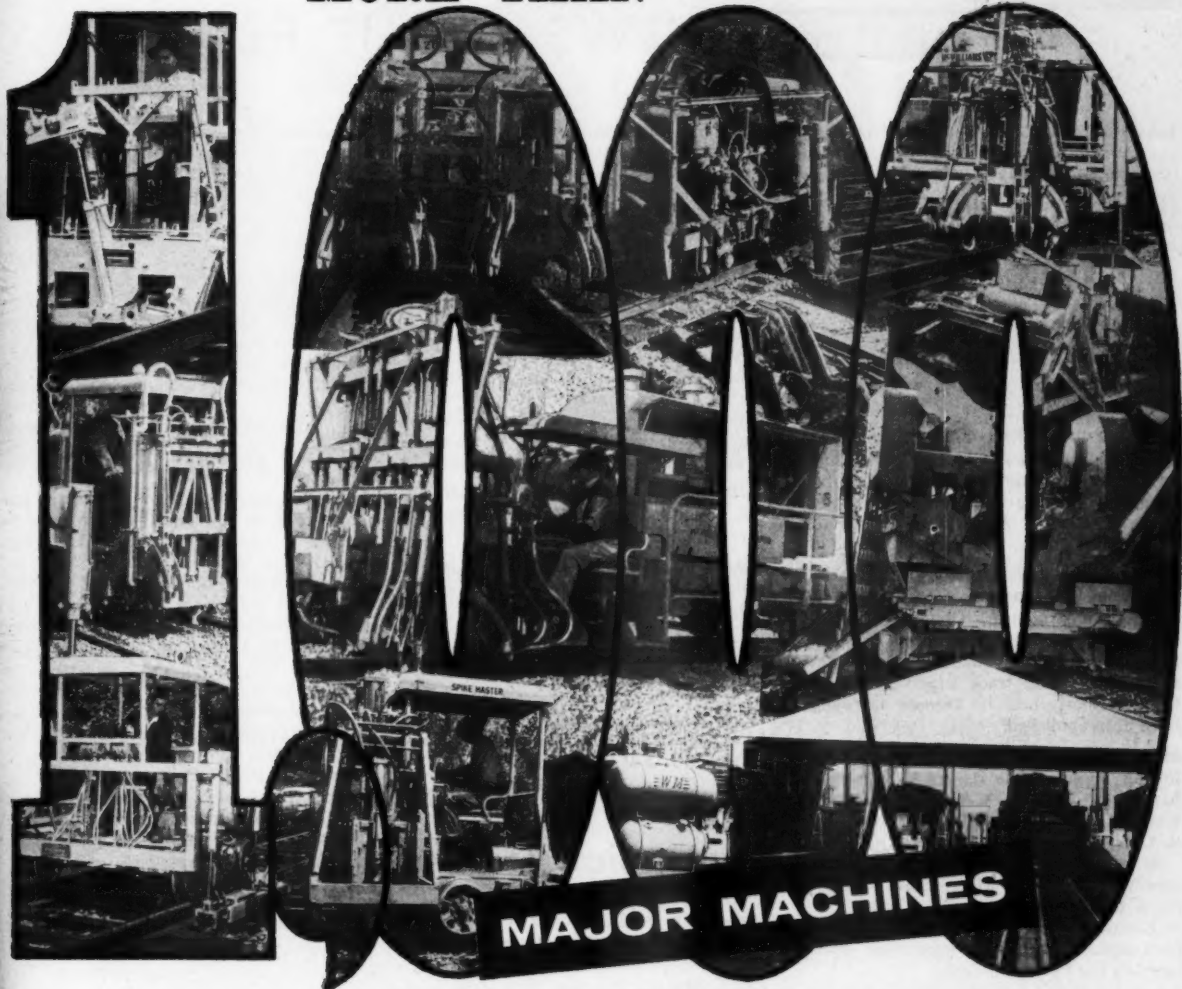
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Railway Maintenance Corporation

BOX 1888 PITTSBURGH 30, PA.

BESSEMER & LAKE ERIE—G. R. Pfisterer, signal engineer at Greenville, Pa., has been promoted to staff assistant to chief engineer there.

BURLINGTON—W. R. Garrett, roadmaster at St. Joseph, Mo., retired recently.

CANADIAN NATIONAL—David W. Blair, general superintendent of the Atlantic Region at Moncton, N. B., and formerly regional chief engineer there, has been promoted to area manager of the Maritime Area of the Atlantic Region, with the same headquarters.

CHESAPEAKE & OHIO—M. I. Dunn, vice president—operation, Cleveland, Ohio, and an engineer by training and experience, has been appointed a senior vice president. Willis D. Gilbert, transportation inspector at Richmond, Va., has been promoted to supervisor track at Logan, Ohio.

DELAWARE & HUDSON—John H. Phillips, engineer of structures, Albany, N. Y., has retired after 37 years of service. The position of engineer of structures, and the position of assistant track supervisor at Albany, formerly held by Carmen J. Young, have been abolished.

DENVER & RIO GRANDE WESTERN—The following appointments as track supervisor have been made: B. L. Warren at Helper, Utah; C. L. Overholt at Salina, Utah; and H. T. Sathman at Provo, Utah.

W. J. Jenkins has been appointed track supervisor at Green River, Utah, succeeding J. E. Johnson who has been transferred to Kremmling, Colo. Malcolm Cooper has been appointed assistant supervisor structures on the Pueblo division.

FRISCO—Hansen Rainwater, assistant roadmaster at Springfield, Mo., has been promoted to roadmaster at Fort Worth, Tex., succeeding D. F. Holt who has been transferred to Fort Scott, Kans. Mr. Holt succeeds C. A. Davis who retired recently after 47 years of service.

ILLINOIS CENTRAL—R. L. Williams, special engineer at Chicago, has been promoted to office manager, office of vice president and chief engineer, succeeding A. M. Campbell who has retired after 54 years of service. Mr. Williams is succeeded by H. L. Read, assistant to division engineer at Memphis, Tenn., who is replaced by H. D. LeRoy, supervisor track at East St. Louis, Ill. Mr. LeRoy is succeeded by C. E. Adams, supervisor track at DuQuoin, Ill., which position has been abolished. C. L. Rasberry has been appointed assistant to division engineer at Paducah, Ky., succeeding R. P. Ainslie who has been assigned other duties.

LOUISVILLE & NASHVILLE—Howard A. Jones, Jr., has been appointed assistant supervisor track at Ocean Springs, Miss., succeeding Morgan M. Moseley who has been promoted to supervisor track at DeFuniak Springs, Fla. Mr. Moseley succeeds James V. King who retired recently.

NEW YORK CENTRAL—W. A. Marx, supervisor track at Cleveland, Ohio, has been promoted to assistant division engineer at Toledo, Ohio.

PENNSYLVANIA—The following changes have occurred recently:

R. T. Meyer, assistant supervisor track at Canton, Ohio, to supervisor track at New Kensington, Pa.; C. D. Barefoot, general foreman track at Pitcairn, Pa., to assistant supervisor track at Pittsburgh, Pa.; G. E. Beinhower, general foreman track at Altoona, Pa., to assistant supervisor track at Steubenville, Ohio. R. D. Johnson, supervisor track at Akron, Ohio, has been transferred to Lewistown, Pa.

SOUTHERN PACIFIC—Carl D. Rodolf has been appointed general track foreman at Sacramento, Calif.

TEXAS & PACIFIC—Floyd R. Naylor, special engineer, Dallas, Tex., retired recently after 48 years of service.

Joseph H. Metzger, 58, who was recently promoted to assistant to chief engineer of the Chesapeake & Ohio at Richmond, Va. (RT&S, Sept., p. 10), was born at Richmond and received his higher education through correspondence courses. Mr. Metzger entered the service of the C&O in 1920 as a rodman at Huntington, W. Va., being promoted to instrumentman at Richmond three years later. All of his subsequent service was located at Richmond and included the positions of resident engineer, special engineer, crossing engineer, locating engineer and assistant engineer. Mr. Metzger was advanced to staff engineer at Richmond in 1958, the position he held at the time of his recent promotion.

Ralph Jones, 43, who was recently promoted to division engineer on the Santa Fe at San Francisco, Calif. (RT&S, Aug., p. 10), was born at Fresno, Calif., and graduated from Phoenix College in 1940. He entered the service of the Santa Fe in 1942 as a draftsman at San Francisco, being promoted to transitman there two years later. He also served in that capacity at Fresno and Los Angeles. Mr. Jones was further promoted to track supervisor at Ash Fork, Ariz., in 1951, roadmaster at Parker, Ariz., in 1952, serving also in that capacity at San Bernardino, Calif., and assistant division engineer there the following year. In 1959 he was advanced to office engineer at Los Angeles, the position he held at the time of his recent promotion.

Magnus C. Christensen, 43, who was recently promoted to assistant division engineer on the North Western at Milwaukee, Wis. (RT&S, Aug., p. 10), was born at Iowa Falls, Iowa, and graduated from Iowa State College in 1941 with a Bachelor of Science degree in civil engineering. Mr. Christensen entered the service of the North Western in March 1941 as a tape-man at Boone, Iowa, being promoted to rodman at Chicago three months later and instrumentman there the following year. From December 1942 to December 1945 he served in the U.S. Army Air Corps as a navigator. Mr. Christensen returned to his former position in January 1946. He was promoted to assistant general bridge inspector in 1948 and bridge designer in 1955. In 1959 he was further promoted to assistant engineer, the position he held at the time of his recent promotion.

Percy H. Geelhart, 47, who was recently promoted to principal assistant engineer on the Milwaukee at Tacoma, Wash. (RT&S, Aug., p. 10), was born at Monroe, Wash., and graduated from Montana State College in 1936 with a Bachelor of Science degree in mechanical engineering. He entered the service of the Milwaukee in 1928, working summers. From 1937 to 1948 he served in various capacities at Savanna, Ill., Minneapolis, Minn., Milwaukee, Wis., and Chicago. In the latter year he was promoted to assistant division engineer at Mason City, (Continued on page 62)

Obituary

R. E. Paulson, assistant engineer on the Milwaukee Road at Chicago, died suddenly on December 2 at the age of 63.

Biographical briefs

Charles T. Yarbrough, 44, who was recently named miscellaneous engineer on the Louisville & Nashville at Louisville, Ky. (RT&S, Sept., p. 10), was born at Murray, Ky., and received his higher education from Murray State College, Peabody College and the University of Cincinnati. Mr. Yarbrough entered the service of the L&N in 1942 as an instrumentman at Latonia, Ky., being promoted to draftsman at Louisville in 1945 and assistant engineer at Ravenna, Ky., in 1947. He also served in the latter capacity at Louisville. Mr. Yarbrough was further promoted to assistant division engineer at Mobile, Ala., in 1950 and division engineer there in 1956. He was serving in the latter capacity at the time of his recent appointment to the position of miscellaneous engineer.



C. T. Yarbrough
L&N



J. H. Metzger
C&O

You can bet your budget dollars...

UREABOR stops weeds

A low rate of application effectively destroys weeds and grasses... prevents regrowth. Easy to apply...nothing to mix...no water to haul.

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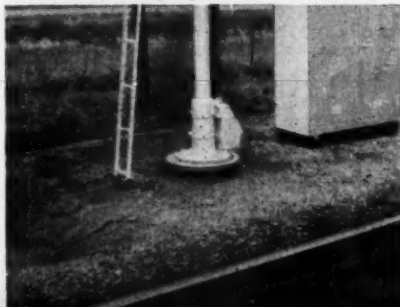
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IMPROVED **FAIR[®]** RAIL ANCHOR

... a résumé of current events throughout the railroad world

In an obvious attempt to slow or halt the growth of piggyback traffic, James R. Hoffa's Teamsters union, in current negotiations with the trucking companies in the Central States area, has demanded that motor carriers pay into the Teamsters' welfare fund a royalty of one cent a trailer-mile when their trailers ride the rails, loaded or empty. Under the union demand there would be a \$5 minimum "royalty" per trailer trip.

Another development in the piggyback field was the decision of the Railway Express Agency to form a subsidiary, REA Leasing Corporation, for the purpose of acquiring highway trailers and containers and operating a national piggyback trailer interchange pool. The equipment pool would be available to all U. S. railroads, as well as to qualified shippers, freight forwarders and others using piggyback service. The plan went into effect January 1.

A proposal to merge the Brotherhood of Railroad Trainmen and the Order of Railway Conductors & Brakemen has been approved by the directors of the two unions. If approved by the respective memberships the proposal would result in a union with about 240,000 members.

A three-judge federal court has rejected a union request that the ICC order approving the Erie-Lackawanna merger be set aside. The judges also dismissed a temporary restraining order issued earlier which had kept all jobs frozen on the merged system. The Brotherhood of Maintenance of Way Employees contended that the ICC order failed to provide job protection as required by the Interstate Commerce Act.

Soo Line merger plan has been approved by the ICC. This plan contemplates the consolidation of three Canadian Pacific affiliates—the Soo Line, the Wisconsin Central and the Duluth, South Shore & Atlantic. The merger will create a 4,800-mile system which is expected to result in annual savings of about \$1.2 million. The new system will be known as the "Soo Line Railroad."

Western Pacific has petitioned the ICC for permission to intervene in opposition to Southern Pacific's bid to acquire control of WP and to support Santa Fe's opposing offer. WP also asked for relief from "illegal and harmful actions" of SP, and asked the ICC to subpoena SP President D. J. Russell to take depositions concerning SP's "exact plans."

A hike in railroad-mail pay was approved by the ICC. The increase amounted to 13 per cent for the southern and western railroads and 8 per cent for the eastern carriers, retroactive to September 1. The increases were negotiated by the ICC and the Post Office Department, and are expected to produce an additional \$35 million annually for the railroads.

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rear trunnion power steering permit it to work in even the tightest quarters with ease.

Other time and money saving features include dual front driving wheels; road speeds from 2 to 18 mph. Torque converter and full hydraulic reversing mechanism are standard. The 110 can be adapted to your particular job needs with various combinations of

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CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

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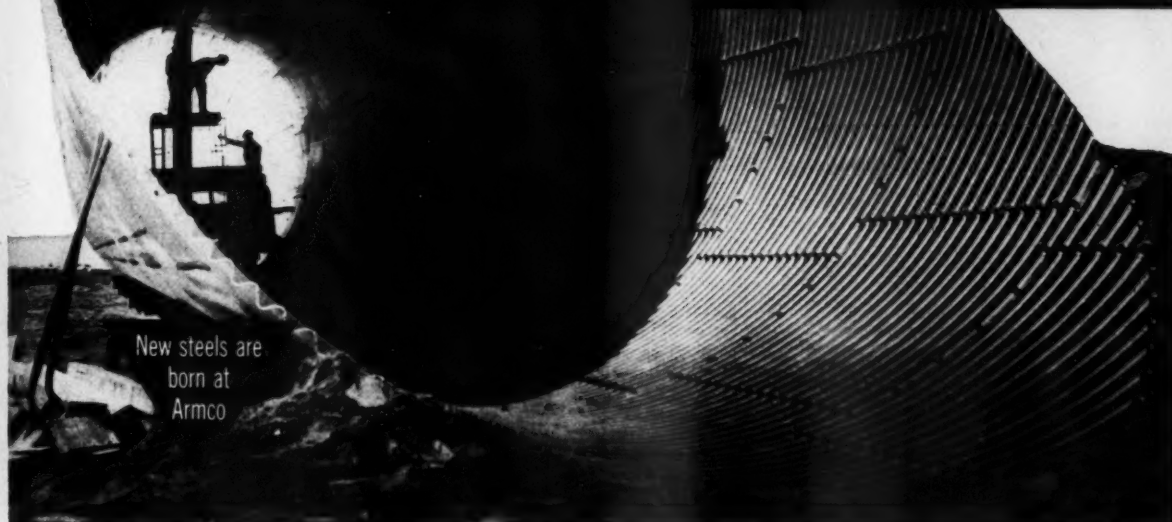
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An Armco Pipe 18 feet in diameter, 216 feet long, helped solve a potentially high-cost problem when engineers had to relocate the Union Pacific tracks because of the new Ice Harbor Dam, Washington. Both sides of the elevated roadbed will be flooded when the dam is completed. And pleasure craft must have access to both sides via a waterway under the tracks.

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Center-mounting mower lowers the tractor's center of gravity to permit safe mowing on slide slopes as steep as 2:1. Shredded vegetation forms a mulch which helps choke new weed growth and retards water run-off, checking berm erosion.

For dealer's name and International Danco catalog, write International Harvester Co., Dept. RTS-1, P.O. Box 7333, Chicago 80, Illinois.



INTERNATIONAL HARVESTER

M/W technology to forge ahead in 1961

Reducing inventory

Railroad management has been keeping a tight rein on inventory. Officers of M/W departments also follow this practice in stocking parts for roadway machines. Any part which can be obtained on short notice is not stocked. But certain equipment items must be kept on hand to protect track gangs from undue delays. This inventory includes specialty items, such as castings, brackets, etc.

Even if inventories of such parts are held through good judgment to protective levels only, their accumulative value can reach considerable proportions.

One way to whittle this down and still protect gangs from delays is for four or five railroads to get together in stocking certain machine parts which can be drawn upon by any one in an emergency.

For example, two roads may own a number of units of a particular machine and no doubt each already carries a considerable inventory of parts for that type of unit. For the parts which most frequently fail, that is as it should be. But for parts which fail with less frequency, but which nevertheless must be on hand in the event of a breakdown, there is little point in both roads stocking these same items. One such part would afford protection for all units owned by both roads.

This plan could be put into effect immediately at all locations served by several roads—large or small. All that is required to implement the plan is the will to get together and agree on which road will handle what parts for each type of machine. The goal is worthwhile because some parts represent a substantial investment.

As the old year ended the experts were busy forecasting the trend of business for the coming year. If past experience is any criterion this is a hazardous undertaking in which events seem to take a malicious pleasure in crossing up even the most learned of those who endeavor to anticipate developments taking shape beyond the economic horizons.

There is, however, an area of forecasting that involves relatively little risk, and that is the technological sphere. In the railroad maintenance of way and structures field, for example, it is not difficult to picture the future course of events in broad outline if one has a grasp of basic trends and conditions in the industry.

Of the conditions now existing in the M/W field the one that will have the greatest influence in shaping future developments is the need for economy. Regardless of what happens to railroad business in 1961 there will be no relaxation of the pressure to cut unit costs. This consideration will overshadow all others in determining the nature of technological changes in the M/W field in the coming months.

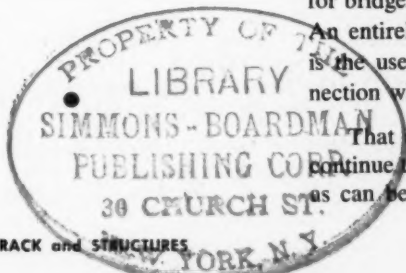
With this thought in mind no special powers are needed to foresee that machinery will continue to be in the spotlight. New and improved units for doing a variety of jobs will be coming on the market. Some of these will represent dramatic forward progress in automation as a means of reducing manpower costs. Included will be machines which incorporate, in a single unit, the functions of sighting, raising and tamping track.

As a labor-saving measure continuous welded rail has demonstrated its effectiveness and will continue to gain in acceptance. Track men are learning, however, that the use of such rail raises special problems not encountered with jointed track. Reduced flexibility in working the track during extremes of temperature is one of these.

Interest will continue to be shown in methods of increasing the service life of rail. Additional railroads will doubtless adopt the practice of cropping rails in track, and there will probably also be more interest shown in methods of butt-welding rails without removing them from track. Efforts will be intensified to find means of solving the problem of shelly rail, especially where it is present in aggravated form due to heavy traffic and unusually heavy wheel loads.

Turning to the field of structures, it is logical to expect that such recent trends as the use of low-cost buildings of various types, economy-type coatings for bridges, and prestressed concrete for bridges (and crossties) will continue. An entirely new development in this field that promises to show rapid gains is the use of epoxies as bonding, binding and waterproofing agents in connection with the construction and repair of masonry structures.

That railroad engineering departments, aided by the manufacturers, will continue to devise means of doing more with less is about as sound a prediction as can be made.



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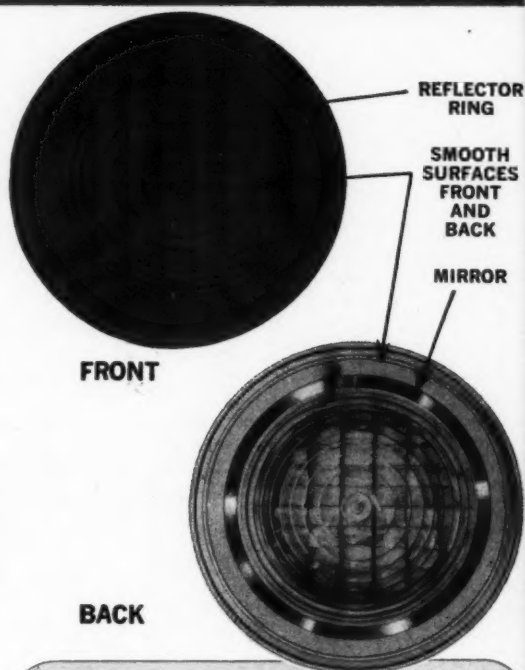
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Pennsylvania panorama of progress

By R. E. Dove
Associate Editor

Behind a big desk on the sixteenth floor of a strikingly modern office building in Philadelphia sits the Pennsylvania's chief engineer, C. J. Henry. On the shoulders of Mr. Henry and his staff rests the responsibility of maintaining and keeping up to date the fixed facilities for a railroad that in normal years grosses in the neighborhood of a billion dollars.

Some idea of the magnitude of this responsibility may be gained by a look at the figures for a particular year, say 1959 which is the latest for which complete data are available. In that year the road's operating revenues amounted to \$888 million. For use in maintaining the properties Mr. Henry was given a total of about \$87 million, including depreciation.

This might seem to be a lot of money. But the PRR is a lot of railroad, with its 13,443 miles of main track, 8,684 miles of side tracks, 10,100 undergrade bridges totaling 220 single-track miles in length, more than 2,500 buildings of all types, and 60 tunnels. Any appraisal of the problems involved in maintaining this plant must take into consideration the fact that the traffic carried averages 130 billion gross ton-miles annually.

What the engineering department was being asked to do was to maintain these facilities with an outlay amounting to less than 10 per cent of operating revenues, with depreciation included in the 10 per cent. This would be a difficult assignment under the best of conditions; increases in wages and prices have made it infinitely more difficult.

As Mr. Henry has put it: "This economic situation imposes . . . the problems of greater production with less personnel, increasing the life of materials, adjusting forces and work methods so that the ratio of maintenance expenditures will be within the limits set by management and, at the same time, keep the road in proper condition for transportation needs."

In this issue we tell the story of how Mr. Henry and his staff have dealt with this problem. Only a cursory examination of the following pages is needed to reveal that the solutions adopted reflect the application of railroad engineering skill of the highest caliber. It is apparent that the approach used was based on a four-step formula involving: (1) A careful study of the possible solutions; (2) selection and trial of the one that seems best adapted to PRR conditions; (3) application of the solution on a system-wide basis as rapidly as possible; and (4) a system of follow-up checks and controls to assure the desired results are being obtained.

There can be little doubt that the measures adopted have made it possible for the maintenance department to accomplish a great deal more work per man-hour. The result is that the amount of money being spent for maintaining the properties represents a smaller percentage of operating revenues than ever before. Thus, Mr. Henry is fulfilling his own concept of the purpose of a railroad engineering department, which "is to construct and maintain facilities at costs that will make possible the transportation of freight and passengers at a profit."

In view of the record as set forth in these pages it is apparent that if the Pennsylvania Railroad does not make a satisfactory profit the reason will have to be sought elsewhere than in the engineering department. It can truly be said that the steps taken by that department, covering as they do the whole gamut of railroad engineering activities, add up to a "panorama of progress."





CHESTER J. HENRY
Chief Engineer

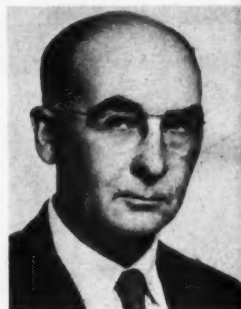
Assistant chief engineers divide major responsibilities



D. E. RUDISILL
Maintenance



J. F. PIPER
Construction



C. J. CODE
Staff

With maximum efficiency the ultimate objective, the PRR's engineering and maintenance of way department is organized to place with local supervisory forces those functions which can best be handled in the field and with general supervisory officers those functions which affect the railroad as a whole.

Department aim is profit for RR



● "The purpose of each American railroad is to make a profit," says C. J. Henry, chief engineer of the Pennsylvania. "The function of any railroad engineering department, as related to this purpose, is to construct and maintain facilities at costs that will make possible the transportation of freight and passengers at a profit.

"With labor and material prices increasing at a rate in excess of the increase in gross revenues, the amount available for maintenance expenditures remains almost constant, and in some cases becomes less. This economic situation imposes on maintenance engineers the problems of greater production with less personnel, increasing the life of materials, adjusting forces and work methods so that the ratio of maintenance expenditures will be within the limits set by management and, at the same time, keep the road in proper condition for transportation needs."

On November 1, 1955, the administrative and supervisory personnel of the Pennsylvania's engineering and M/W department went through a

complete transformation. This was carried out in connection with a reorganization affecting all departments and was the result of a year's study by a firm of management engineers, which was engaged by the railroad in the interest of operating efficiency. The goal of the reorganization was to decentralize all those functions which could best be handled on the ground, with a clear-cut policy from system headquarters, and to centralize those other functions affecting the system as a whole.

The desired decentralization was obtained by establishing nine regions, each with a completely staffed railroad organization headed by a regional manager, who is in charge of all phases of the business in his area. The regional manager has on his staff a regional engineer who has supervision over maintenance of way and structures matters in his territory. His field force consists of two or three district engineers, a supervisor of structures and several supervisors of track and of signals and communications. The regional engineer also is assisted by a supervisor of M/W materials and equipment and an engineer of signals and communications, the latter having a field force of inspectors.

On the system level, the department

(see organization chart) is headed by C. J. Henry, chief engineer, who reports to the road's vice-president, transportation and maintenance. Mr. Henry is aided by three assistant chief engineers, D. E. Rudisill, J. F. Piper and C. J. Code, each with his own area of responsibility.

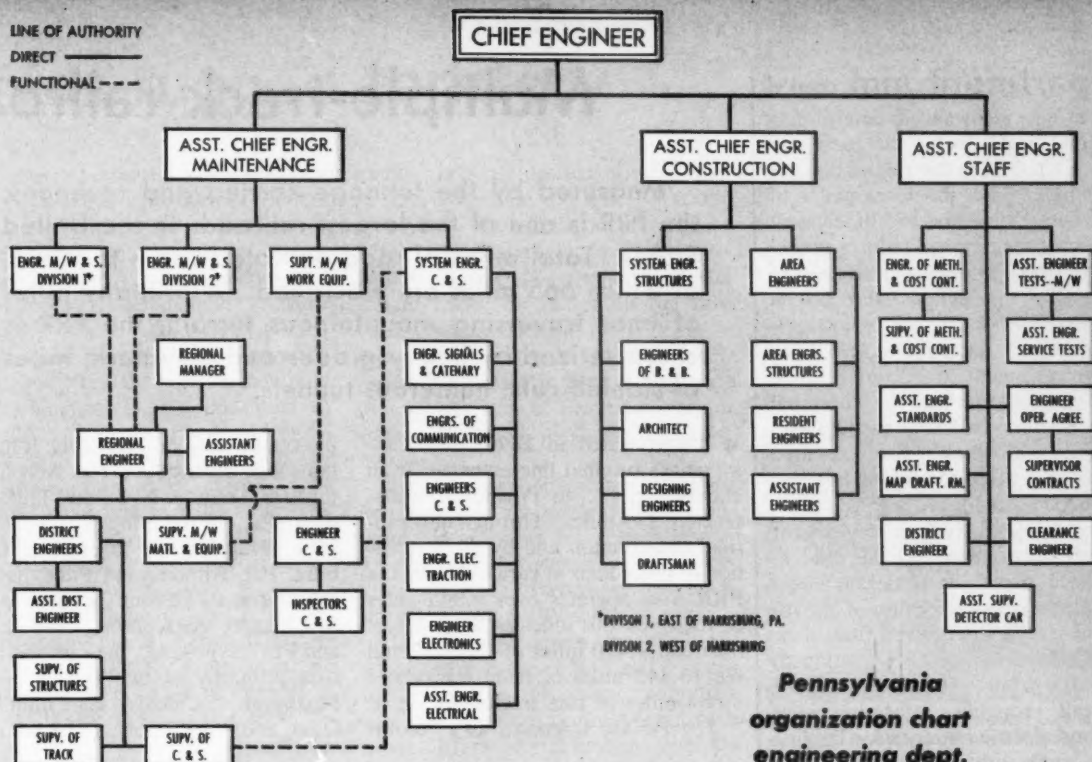
Mr. Rudisill is in overall charge of maintenance matters relating to road, structures, communications, signals and electric-traction facilities. He reviews budget requests of regional engineers, establishes and coordinates maintenance programs, allocates rail, ties and ballast to the regions, controls system rail-cropping, tie-treating and reclamation plants, establishes standard maintenance methods and procedures, and controls the system budget for maintenance expenditures.

He is assisted by four key officers: Two engineers M/W and structures, one handling work on lines east of Harrisburg, Pa., and the other lines west; a superintendent of work equipment; and a system engineer, communications and signals. The two engineers M/W and structures, E. R. Shultz and C. F. Parvin, have the same responsibilities as Mr. Rudisill over their respective territories with functional direction of all maintenance activities on those divisions.

LINE OF AUTHORITY

DIRECT ———

FUNCTIONAL - - -



**Pennsylvania
organization chart
engineering dept.**

The superintendent M/W work equipment, C. F. Montague, reviews all requisitions for the purchase of new machines, prepares authorization requests, establishes and maintains records of all roadway machinery and work equipment, programs and prepares budgets for the general overhaul of this equipment, has general supervision over the M/W&S shops, and analyzes the costs of maintaining, modernizing and retiring this equipment.

The system engineer, communications and signals, F. L. Chatten, prepares plans and specifications for the construction and maintenance of communications, signals and electric-traction fixed facilities and establishes standards for their construction, maintenance and inspection. He also prepares schedules to insure compliance with those standards.

In heading up the construction sub-department, Mr. Piper has overall control of all construction work on the system roadway capital-expenditures budget, as well as the preparation and administration of the capital budget for the entire railroad. He supervises the preparation of plans, specifications and estimates for major new construction projects, negotiates agreements with municipal, state and federal agen-

cies, controls land surveying and the preparation of plans incidental to this work, prepares engineering studies and analyzes, and maintains liaison, either direct or through the area or regional engineers, with appropriate state, municipal and other local regulatory and administrative authorities. He is assisted by a system engineer of structures, four area engineers and other assistants.

The system engineer of structures, J. E. South, is responsible for the preparation of designs, specifications and estimates for new construction as well as for the alteration and repair of bridges, tunnels, docks, wharves, coal and ore facilities and other major structures. He also rates all bridges for motive power and special shipments and checks all plans made by outside engineers and architects for facilities involving the railroad. On his staff are 3 bridge engineers, 3 architects and 28 designers and draftsmen.

The four area engineers, located at strategic points on the system, collaborate with the regional managers and regional engineers in the preparation of plans, specifications and estimates for all construction, major repair and renewal projects, negotiations with federal, state and local agencies, and the letting of construction contracts,

and are responsible for the control of construction expenditures. These officers are J. W. Wallenius at Philadelphia, H. J. McNally at Chicago, K. J. Silvey at Pittsburgh and C. R. Uitts at Baltimore.

In heading up the staff sub-department, C. J. Code has overall direction of all laboratory and service tests of maintenance, construction and engineering materials and machinery, and handles miscellaneous technical problems for the chief engineer. He also is responsible for the establishment of the department's standard plans and has general supervision over matters pertaining to methods and cost control, operating agreements, clearances and the map drafting room. His key assistants are: R. E. Kleist, assistant engineer of tests, M of W, who is located at the Altoona, Pa., laboratory and is in charge of service tests; M. C. Bitner, manager methods and cost control; C. E. Gipe, engineer of operating agreements; J. G. Greenlee, clearance engineer; M. P. Moore, assistant engineer in charge of standards drafting room and R. D. McGonnigle, assistant engineer in charge of the map drafting room.

"Our research and tests department," comments Mr. Henry, "has been invaluable to us in the develop-

Department aim cont'd

ment of new ideas and in determining the right materials for the particular job." He points to the rail sections as an example. Since the development of the 133-lb, 140-lb and 155-lb sections, a review of the new-rail failures occurring in the 10-year period before 1946, when the sections were placed in service, with a 10-year period subsequent to that date, showed a 99 per cent improvement.

He also referred to the continual testing of stone ballast at each quarry, a practice which has not only resulted in improved track conditions but also in reduced costs for ballast. Research and tests of anti-splitting devices for crossties have persuaded the road to apply steel dowels in all ties, at a cost of 30 cents per tie, because of the increased service life derived from their use. Other developments relating to rail-end welding, surface-grinding of rail, rail cropping, reforming joint bars, and electric batteries for lighting switch lamps, are directly attributable to tests made by this sub-department.

Since the M of W research and tests department first started its work in 1929, more than 750 tests have been or are in process. From 150 to 175 tests are in the active stage. One of the current tests is the placing of strain gauges in $\frac{1}{8}$ -in holes drilled in the heads of rails for the purpose of measuring contact stress immediately beneath moving wheels. Another involves the use of strain gauges placed in the webs of 100-lb rails to determine why web failures are increasing on branch lines where heavy diesel locomotives are now in use.

Other current tests involve proprietary products. Field tests are being conducted with weed and brush killers, rail anchors, rubber highway-crossing surfaces, switch targets, radioactive switch lamps, flashing switch lamps, depth-hardened frogs, three kinds of building siding, tie coatings, glued rail joints, blast-hardening of manganese castings, tie pads and bridge-painting systems.

In addition, several types of insulated joints are being tested. These include the Permali joint, made of compressed, resin-impregnated wood, a number of which have been in the track for several years. Another type under test is the AAR joint, with rubber insulation. A joint of this type has been in track somewhat more than a year.

Multiple-track railroad

Measured by the tonnage carried and revenues, the PRR is one of the largest railroads in the United States. Total miles of road operated come to 9,895, of which 665 miles are electrified. With many miles of lines traversing mountainous terrain, the PRR is characterized by heavy grades and curvature, miles of sidehill cuts, numerous tunnels.

● Incorporated in 1846, the Pennsylvania's original line extended from Harrisburg, Pa., to Pittsburgh, a distance of 249 miles. Through new railroad construction and by the acquisition of other lines at various times, the PRR now operates over 9,895 miles of road. Of this mileage, PRR forces maintain 9,430 miles of roadway and the 13,443 miles of main tracks and 8,684 miles of side tracks laid on it.

The Pennsy is known as a "multi-

ple-track" railroad. Roughly, it maintains four main tracks from New York through Trenton, N. J., and Philadelphia, Pa., to Wilmington, Del., and from Philadelphia through Harrisburg, Pa., Altoona and Pittsburgh to Rochester, Pa. From the latter point to Chicago, via Canton, Ohio, Lima and Ft. Wayne, Ind., the railroad consists primarily of two tracks. From Pittsburgh to Chicago, via Columbus, Ohio, and Logansport, Ind., the rail-



...serves rugged territory

road also is essentially a two-track line. Several other portions of this extensive railroad, such as its lines to Buffalo, N. Y., Ashtabula, Ohio, Cleveland, Ohio, Cincinnati, Ohio and Indianapolis, Ind., include multiple tracks.

The road has electrified operation from New York through Philadelphia to Washington, D. C., and west to Harrisburg, Pa., and Enola. In addition to the main passenger routes, the Morrisville, Pa., to Columbia "low-grade" freight line and the Columbia to Perryville, Md., branch are electrified. This totals 665 miles of road and 2,189 miles of track.

In terms of tonnage and revenues, the Pennsylvania is known today as one of the largest railroads in the United States. It hauls an average of almost 200 million tons of freight an-

nually. It is not unusual for the road to haul 50 billion ton-miles of traffic in a year. This earns an average of \$760 million annually in freight revenues. About 53 per cent of the freight traffic originates on the railroad. Since much of the mileage is located in important coal and steel-producing areas, it is not surprising that 90 per cent of the road's freight traffic is related to these two categories.

PRR's passenger business is said to be larger than any other railroad company. It accounts for approximately 13 per cent of the road's total operating revenues. Passenger trains are operated over 4,249 miles of road.

The Pennsylvania's trackage extends through the rugged and difficult terrain of the Allegheny mountains and other portions of the Appalachian chain. Many of the lines parallel the important rivers of the territory, including the Delaware, Susquehanna, Allegheny, Monongahela, Ohio and lesser streams, such as the Juniata and the Conemaugh. Often the railroad is on a side hill cut with steep, sometimes mountainous slopes up from the railroad with the river nearby on the other side. Because of this situation, the roadbed is vulnerable to slides and washouts with resultant high restoration and maintenance costs.

As might be expected, it was necessary for the line through the Appalachian chain to be constructed with numerous curves, many tunnels and heavy grades. Curves as sharp as 10 deg 30 min and grades up to 2.11 per cent compensated are found on the main line. The Horseshoe curve near Altoona, with its 200 deg of central angle and a maximum curvature of 9 deg 25 min, is probably the most famous railroad curve in the world.

The PRR has a total of 60 tunnels aggregating 24.55 miles in length. In the New York area alone it has 10 tunnels, including 6 single-track tunnels under the Hudson and East rivers. In recent years a concerted program has been carried out to "daylight" or enlarge tunnels to eliminate clearance restrictions.

Adding to the difficulty of maintaining such a railroad are the many congested areas through which the lines run. Many street and railroad



SCALING ROCKS from side-hill cuts is done annually in hilly Pittsburgh region.

crossings at grade and interlocking plants must be maintained. In some cities the railroad is either elevated or depressed or is carried in tunnels. Line changes have even been made at many locations to avoid congested areas.

Much of the eastern territory served by the Pennsylvania lies in the path of the Atlantic hurricanes which occasionally devastate wide areas. Winds of over 100 mph have torn buildings apart, uprooted trees and cut down signal, telephone and power lines. The heavy rainfalls which usually accompany these storms have washed out bridges, culverts and long stretches of track. High tides have smashed docks and piers and inundated and damaged coastal installations.

Such storms have cost the Pennsylvania millions of dollars. In June, 1957, Hurricane "Audrey" alone, with its 10.5 in. of rainfall, made necessary the expenditure of \$1.2 million for reconstruction and \$125,100 in detour costs. Hurricane "Diane" cost the railroad over \$1.4 million in 1955. Hurricane "Hazel" caused slides, washouts and damage to power lines, bridges and buildings to the tune of \$1.3 million in 1954. A snow and sleet storm in November 1950, with its strong winds and heavy precipitation followed by freezing temperatures, cost the PRR \$2.9 million in reconstruction costs.



LEGEND

- SINGLE-TRACK LINE
- == MULTIPLE-TRACK LINE
- ★ SYSTEM HEADQUARTERS
- REGIONAL HEADQUARTERS
- ☆ M/W EQUIPMENT SHOP



NO. 20 TURNOUTS are used generally for high-speed, mainline turnouts and crossovers on the Pennsy.

Heavy tonnage demands high track standards

Track standards on the PRR had to be tailored to carry as dense traffic as any railroad in the country. For this reason about 70 per cent of the rail in main track is 130-lb or heavier. Other features include an ample ballast section of heavy material and treated hardwood ties, all of which in recent years are dowelled before seasoning. Because of heavy curvature most rail is still laid with conventional joints.

● Tracks of the PRR carry an average of 130 billion gross ton-miles annually, most of the traffic consisting of coal and iron and steel products. Under these circumstances its engineering officers don't believe in sending a boy to do a man's job; they've developed a track structure that in every way is engineered to carry the loads and to take the pounding imposed upon it.

Rail—In 1931, the Pennsylvania developed the 152-lb rail section, the largest T-rail section then known, for its heaviest tonnage territory and the 131-lb section for its lines of lesser traffic. In 1946, it developed the 140-lb and 133-lb sections to take the place of the 131-lb, and the 155-lb to take the place of the 152-lb. In 1958, in view of the good performance of the 140-lb section and in the interest of reducing the number of the manufacturer's rolls and patterns for rail and fastenings, the road gave up the 155-lb section. Since that year, the PRR has purchased only the 140 RE and the 133 RE sections for its new rail programs, and keeps only a small amount of the heavier sections on hand for turnout repairs. Today, the majority (about 70 per cent) of the rail in main track is 130-lb section and heavier. All new rail purchased is control-cooled. Rail to be laid with conventional joints is end-hardened.

In general, new rail is laid on the road's lines from New York to Chicago, from Pittsburgh to St. Louis, and

from New York to Washington. This is the equivalent of about 32 per cent of the road's main-track mileage. It provides the relayer rail required for the remaining main tracks, branch lines, yards and sidings.

However, new rail is not laid on the heavy curves found in the mountainous territory for the reason that it wears out too rapidly. Better service is obtained by using relayer rails, with their work-hardened surfaces, for those locations. Rail on curves is transposed as necessary. Heat-treated material is used for stock rails and switch points. Where necessary, rail-and-flange lubricators are used on curves 2 deg and sharper.

The Pennsy has not standardized on the use of continuous welded rail. Its engineering officers feel it has too many sharp curves on its main lines to make such rail practicable. However, beginning in 1957 from 15 to 20 per cent of the new rail tonnage has been welded into long strings, which are laid at suitable locations. At present the road has about 31 track-miles of continuous welded rail in the 133-lb and 155-lb sections on its main tracks. A considerable amount (139 track-miles) of secondhand and cropped rails has been welded into the longer lengths for use on branch lines and in yards. This includes long welded strings of fit rail which were used in the construction of the Conway yard near Pittsburgh.

The PRR pioneered the development and use of rail-grinding trains. The first such train, developed in 1937, was used primarily to remove corrugations from the rail surfaces. The road now operates eight such cars which grind a total of 315 to 700 miles of track each year to remove corrugations and engine burns. The PRR does not use rail-grinding trains on new rail to remove mill-scale imperfections and for smoothing the joints unless the rails have been welded into long strings. In these instances, the purpose is to eliminate all humps at the welds and any deficiencies in grinding at the welding plant. Ordinarily, the grinding trains are operated after the summer work gangs have been discontinued so as to minimize interference with main-track traffic.

Develops device for measuring gage

A device recently developed on the Pennsylvania is a track-gage indicator for use by its supervisors of track. This consists of a gage-measuring and dial mechanism, mounted on a unit with four flanged wheels. It is designed to be pushed at a speed of about 5 mph by one of the road's Jeep rail-highway inspection cars or by a one-man inspection motor car.

The measuring device consists of a spring-loaded steel shaft with a tubular receptacle which bears, by means of steel contact wheels at each end of the shaft, against the gage lines of both running rails when in operating position. Any variation in track



MAJORITY of the rail in the road's main tracks is 130-lb section or heavier. All new rail purchased currently is 133 and 140-lb sections, which is all control-cooled.

The testing of rails in track for defects is a continuous operation on the Pennsylvania. Both the Sperry and AAR testing cars are employed. In addition, the Audigage tester is used throughout the system for testing the joint-bar areas of the rails and through highway crossings. All main-track rail is tested on a definite schedule of from 6 months to 3 years. About 7,000 tons of rails per year are used for replacing rails which have been found defective.

Joint Bars—The 36-in, 6-hole toeless, head-contact joint bars are standard on the PRR for rails 130-lb and heavier. The AREA specifications are now used when ordering new joint bars. The 24-in, 4-hole bars are used for rails 100-lb and lighter. Bars to be reused are reformed and are made oversize in the fishing space. They are

reformed in a company plant at Chambersburg, Pa., as well as by contract at Verona, Pa. New oversized bars are purchased as required to fill out any deficiency in numbers.

It is standard practice on the PRR to use 1 1/8-in bolts for 130-lb and heavier rail sections, 1-in for 100-lb and 13/16-in for 85-lb. The use of 1 1/8-in bolts was started in 1916. Since then there have been very few breakages. Bolts recovered from relays are reclaimed at Hollidaysburg, Pa., and sent out for reuse, mostly for yard work. Helical spring washers, made to PRR Specifications, are used on the track bolts.

Tie Plates—Current standards for tie plates include double shoulders and the AREA plate punchings. For the 152-lb and 155-lb rail sections, a

7 3/4-in by 15 1/2-in canted plate is used. For the 131-lb, 133-lb and 140-lb rail sections, a 7 3/4-in by 14 3/4-in canted plate is used. For 130-lb rail a 7 3/4-in by 14-in flat-bottom tie plate is standard.

The PRR recently changed its spiking-pattern standard to reduce the number of spikes being used. Two rail spikes only per plate are used on tangent track and on curves less than 1 deg where the traffic is less than 10 million tons annually. Two rail spikes and one anchor spike are used on tangent track and on curves under 1 deg where traffic is 10 million tons or more per year. Two rail and two anchor spikes are used on curves from 1 to 3 deg, regardless of the amount of traffic, and on curves over 3 deg where the traffic is less than 10 million tons annually. Three rail and two anchor spikes are used on curves over 3 deg and where traffic amounts to 10 million tons or more per year.

The road's standard track spike is a 5/8-in by 5/8-in by 6 1/2-in full-throat cut spike, although the shorter 6-in length may be used in yard tracks and sidings where No. 1 and No. 2 cross-ties are used. New spikes are used in connection with rail relays.

The practice on the PRR is to use tie pads on bridge ties located on the main lines and heavy-traffic branches. Pads also are used in tunnels and to some extent through timber-panel highway crossings.

Rail Anchors—Several makes of base-type rail anchors are in use on this road. In general, the anchor pattern on multiple tracks is to apply 8 anchors per rail length in the direction

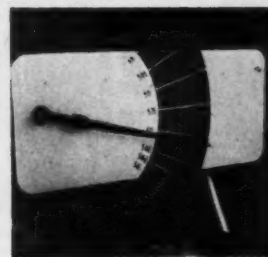
gage is translated through a series of three rack-and-pinion assemblies to an indicator dial, which is supported at eye-level height on the front of the indicator car.

The indicator works on a ratio of 5 to 1 to amplify the variations so they can easily be read on the dial to the nearest 1/8 in. Also, the indicator dial is colored green for the readings under 57 in and red for readings over that figure for assisting the operator in detecting wide gage. The measuring assembly is raised when not in operating position.

A second model of this device is being constructed at the Altoona shops. In addition to the gage-measuring device the new model will have a pendulum-potentiometer to detect variations in cross level.



TRACK-GAGE indicator (left) is pushed by a Jeep inspection car or a motor car. Variation in gage is indicated on an eye-level-high dial (below) which is mounted on device.



Track standards cont'd

of traffic and from 2 to 4 anchors in the reverse direction. For single track, the practice is to apply from 6 to 8 anchors per rail length for each direction, which are applied so as to box the ties. More anchors may be used where special conditions prevail.

Ballast—The Pennsy is a staunch proponent of the heavier ballast materials. Its standard plan calls for 12 in of gravel sub-ballast and at least 12 in of stone ballast under the ties.

The road's specifications are more rigid than those of the AREA. It has three sizes of crushed stone. The "Z"-size passes a normal square opening of $\frac{5}{8}$ in to $1\frac{3}{4}$ in and is used on main lines. The "Y"-size passes a $\frac{5}{8}$ -in to $1\frac{1}{4}$ -in square opening and is used at certain locations. A "special-inch" type, $\frac{3}{8}$ -in to $1\frac{1}{4}$ -in. in size is not used where machine ballast cleaners are operated because too much of it would be lost through the screen.

For its main lines east of Crestline, Ohio, and Columbus, the road uses Class "A" and "B" traprock ballast. West of Columbus, because of the long haul which the use of traprock would involve, the road uses a Class "D" ballast of good quality limestone. Slag ballast is used on the Northern and some of the Lake regions. Formerly, extensive use was made of gravel ballast on secondary main lines and cinders on branch lines. When these tracks are being reworked, the gravel is now being replaced by stone ballast and the branch-line cinders with the "special-inch" stone or slag ballast. The Mannix plow is sometimes used on these occasions.

At one time, the PRR did a great deal of ballast cleaning by hand-forking and small machines. Today, it uses four Brownhoist ballast-cleaning

trains which the road developed for this work, and also contracts some of this work to the Speno Company. Starting about May 1 of each year, and working 24 hr per day for five days a week, the Brownhoist outfits are operated until about November 1 of each year. Although they must stop work each time a train passes on an adjacent track, each of these trains will average about five miles of track cleaning per day. An idea of the amount of ballast renovation accomplished by these outfits can be had by reviewing their cleaning records. In 1956 they cleaned 3,305 miles of track; in 1957, 3,225 miles; in 1958, 2,361 miles; in 1959, 1,983 miles; and by August 1, 1960, they had already cleaned 1,426 miles of track.

Crossties—All ties are purchased in accordance with the road's own specifications, which are similar to AREA's, and are all hardwood, mostly oak. They are air-seasoned from 8 to 12 months, depending upon their size and species, and are treated with a 60/40 creosote-coal-tar solution by the pressure process. Treatment is done under contract at three locations: Orrville, Ohio, Marion and Indianapolis, Ind.

The ties are 8 ft 6 in long. No. 1 and No. 2 grades are used for yard and side tracks; No. 3A, 4 and 5 for main lines; and No. 3 for branch lines. The main-line crossties are protected against splitting at their ends with steel screw dowels applied two at each end before seasoning.

Track gage—The PRR is one of the few railroads in the country which deviates from the conventional standard track gage on tangent track. It prefers the tight gage of 4 ft 8 $\frac{1}{4}$ in because it feels that this will reduce wheel oscillation. However, on curves up to 10 deg, a gage distance of 4 ft

8 $\frac{1}{2}$ in is used and on curves over 10 deg a gage of 4 ft 9 in is maintained. Also, in turnouts sharper than the No. 10, the gage is widened to 4 ft 9 in through the lead.

Turnouts—The road has four basic standard turnouts which are the same numbers as those recently adopted by the AREA. These are No. 8, 10, 15 and 20. There are in track a large number of turnouts of other angles, such as the No. 4, 5.289 and 6, which are necessary for special situations on industrial tracks, and the No. 30 which is used for a few locations for high-speed operation at the end of double track. The switch rail lengths and lead distances are different from the AREA recommended practices due largely to the 7-in heel spread, which was adopted to meet the base widths of the 152 and 155-lb sections. With the discontinuance of the purchase of 155-lb rail, it is hoped eventually to adopt AREA recommended practices for turnout material throughout, but this will involve a long changeover period due to the complications involved in changing switch and lead lengths and in relocating the point of switch.

In general, the road uses No. 20 turnouts for high-speed, main-line turnouts and crossovers, and No. 10's for sidings. With the elimination of steam locomotives, greater use is being made of No. 8's. It uses 45-ft and 30-ft curved switches in its No. 20 turnouts, 30-ft curved switches in its No. 15 turnouts and 20-ft curved switches for its No. 8 and 10 turnouts.

Weed and brush control—Like many roads, the PRR has used a wide variety of chemicals and equipment to fight vegetation. Aromatic oils and weed-killing chemicals in water solution are sprayed on the main lines. Weed burners are used to a large extent on branch lines and to some extent on the shoulders of main lines. In yards, the road reports good results are being obtained since 1957 by the use of soil-sterilant chemicals and, from continued use, it expects that both the application and cost will be reduced.

The PRR contracts a certain amount of brush spraying. But it also depends largely on its own cutting equipment, later treating the stumps. For brush-cutting work it uses shoulder pack-type sets, rotary cutters towed by tractors or suspended from the booms of locomotive cranes, sickle-type mowers and power saws.



BALLAST CLEANING is largely done by four Brownhoist trains which the road developed for this work. These outfits average about five miles of track per day.

Needed—An open mind

Says M. C. Bitner, who heads up the PRR's Methods and Cost Control committee: "Work simplification is not difficult but requires an open mind and some training in the use of the tools, charts and techniques that are necessary. . . . People assigned to method study should not be influenced in the least by previous methods of doing work. For each process being studied and for each step in the process, the following questions must be asked: Why, what, who, where, when and how? Answers to these questions will determine whether the process, or any step in it, can be eliminated and whether it is being done at the right time, at the right place and by the right person or machine."

How special task force

watches over methods and costs

A methods-and-cost-control department has been established on the PRR for developing ways to lower unit costs through maximum efficiency in the use of labor, machines and materials. Current expenditures are made known promptly through IBM accounting to all levels of supervision so that corrective steps may be taken whenever the work of any gang appears to be falling short of optimum performance.

● With costs of labor and materials rising and with maintenance allotments remaining almost constant it became apparent to PRR officers that extraordinary steps would have to be taken to reduce unit costs if the property was to be adequately maintained. To spearhead this effort the position of manager of methods and cost control was established in 1955 at the time the road's system-wide organization was revamped. Since then, the title has been changed to engineer of methods and cost control.

This officer and his staff are responsible for making recommendations to line supervision of plans to reduce waste involved in the use of labor, machines and materials. They develop and evaluate facts on which such plans are based, predict the savings that will be made, and check actual performance to determine whether or not the anticipated savings are being effected. This information is furnished to M/W supervision at all levels for the effective management of labor, machines and material under their control.

To assemble the necessary data and distribute the information not only to the system and regional officers cur-



rently, but also down to the supervisors and foremen responsible for the work, a procedure had to be developed. To this end a group of maintenance officers was sent to study industrial-engineering methods. This group developed a code method of reporting

hours of labor expended on 117 items of track maintenance.

The basic information for cost control stems from daily labor distribution reports made out by the foreman of each gang doing track, bridge, building, signal, communication and catenary work. He prepares two copies, one of which is forwarded to his supervisor and the other to the auditor of expenditures. (The road's accounting offices are located at Chicago, Pittsburgh and Philadelphia.) These statements include information on the type and amount of work done, the date, work location and the number of man-hours at various rates of pay used in doing the work. The foreman also makes out a 15-day time-card report for each man in his gang and sends it to his supervisor for checking. The supervisor, in turn, forwards it to the accounting department for the preparation of the paychecks.

The daily labor-distribution report is processed immediately by the accounting department, the information being key-punched on IBM cards. The data are used for ICC accounting, including a 12-day statement, and monthly and quarterly cost-control statements of actual expenditures. These statements show units for every type of work performed, total man-hours, man-hours per unit, and money expended. They also include monies for work done for other departments.

Each foreman receives a copy of a monthly statement showing this information for his own gang. Each supervisor's monthly statement gives information for his several gangs. District

Has low M/W ratio

The Pennsylvania has one of the lowest maintenance-of-way ratios in the United States and has consistently held it below the average for all Class I roads. Here are yearly comparisons since 1950:

Year	PRR	All Class I Roads
1950	12.47	13.61
1951	12.23	14.23
1952	12.52	14.36
1953	13.69	14.85
1954	11.40	14.43
1955	10.87	13.73
1956	10.64	13.32
1957	11.60	13.63
1958	10.55	12.79
1959	9.80	12.58
1960 (Est.)	10.20	12.53

Watches methods and costs cont'd

engineers get statements which include this information for the supervisors in their respective districts, regional engineers for their districts and system officers for the regions. Regional engineers thus are able to check unit costs to see if any are out of line, to note if too much miscellaneous and non-program work is being done, and to compare the total charges against their budgets. Any corrective steps necessary can then be taken to get the charges back in line.

The monthly reports are used in the same manner at all supervisory levels. It is reported that regional engineers can review their copies in 15 min and pin-point any work that shows high costs. District engineers and supervisors can get the information they need from these reports in 30 min.

Several annual summaries also are

issued. They are distributed to regional and system officers, and compares the current year's progress with the two prior years. The information in the annual report includes all items of work, and gives number of units, man-hours per unit and man-hours saved during the current year as compared with the preceding year. By regions it shows the money spent for program work, other maintenance, and vacations and holidays. It also includes a statement on the labor expenditures by money and man-hours by ICC accounts for the system. The value of these annual statements is that they serve to point up the amount of non-program work being done so that attention can be given to reducing the costs and amounts of such items.

Another function of the methods-and-cost-control section is the con-

tinual development of improved methods to reduce costs of doing work. These efforts are aimed at work simplification. First a study of the existing methods is made, using one or more of the available techniques to determine the actual time required for each element of the job. This is broken down into sufficient detail to permit a thorough analysis of the process. The information is plotted on appropriate charts, which are then analyzed to determine how the unproductive time can be reduced.

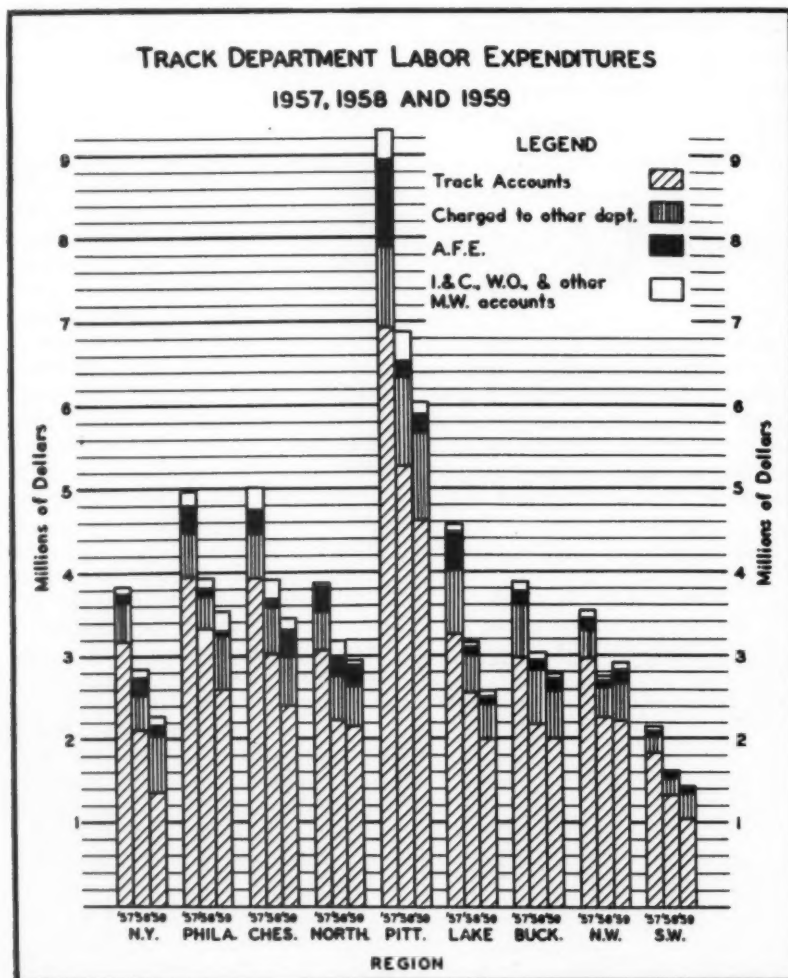
A motion-picture camera is used for time studies. The camera used can take pictures at 60, 100 or 1,000 frames a minute. The rate of 100 frames a minute is preferred and the majority of PRR picture studies are taken at that rate. However, where the cycle of work is short the speed of 1,000 frames a minute is used. The road reports the camera to be especially valuable for studying gangs which otherwise would require several observers with stop watches.

The projector used has reversible and variable speeds and can show each frame separately. It has a counter for obtaining the actual time of each element of the operation. The film is re-run as often as necessary to give information for the entire operation.

Revised charts are then prepared for the proposed new method, after which it is actually tried out in the field. Sometimes several tentative new methods are charted. Even after the new method is tried in the field, revisions may be made before the final gang organization and method instructions are recommended for use.

Man-hours cut 56 per cent

When the Methods and Cost Control committee began to function in 1955, it visited other railroads and studied their gang organizations and machines in action. Its long-range aim was to reduce unit labor costs by carrying out maintenance with small mechanized gangs instead of with the time-honored section and extra gangs. In 1956, a trial of mechanization was made on one district by equipping a few extra gangs with modern machines for tie-renewal and track-raising work. The machines acquired for one gang represented an investment of about \$205,000. The results of the trial were satisfactory and resulted in a reduction in man-hours of about 56 per cent. In addition, the work was found



THREE-YEAR comparison of track-labor costs is depicted by chart for each region. Chart is reproduced from the road's annual analysis of track-department labor expenditures.

to be better and every tie was given the same uniform tamping.

A second type of gang was organized to take care of general surfacing or skin-lift operations. Again the results were satisfactory.

From these trials it was decided to adopt the cycle-maintenance principle and to expand it to system proportions as fast as the money for machines and equipment became available.

In 1957 the work of the bridge and building forces likewise came under scrutiny. It was found that unit costs for this work had been mounting, with the result that the amount of this work that could be done with available funds was shrinking and there was a rising backlog of deferred maintenance. The study also revealed that carpenter gangs, comprised of from 8 to 10 men, were frequently working on jobs which would require only 4 men if equipped with the proper tools. Also, such gangs could not do work of other crafts to complete items of programmed work, and gangs larger than five men could not be adequately supervised by one foreman.

Other findings were that gang efficiency was being impaired by having to handle, store and cover materials received from the purchasing and stores departments; that inadequate programming was resulting in too much time being lost in traveling and making camp set-outs; that emergency work, capital-account items and joint projects were competing with regular maintenance; and that certain deficiencies in equipment existed.

Certain objectives of the proposed plan to mechanize and reorganize the B&B forces were set up. One was to cut down and eventually reduce the backlog of deferred maintenance. This was to be done by reducing, to the fullest extent possible, the number of facilities to be maintained; by assignment of some variable portion of the available force to catch up on deferred maintenance of the facilities retained; and by rigorous programming of bridge and building work.

Another objective was to place maintenance of bridges and buildings on a cycle basis as rapidly as possible. This was to be brought about by: (1) Incorporating the work done on deferred maintenance items into the cycle as they are completed; (2) incorporating regular maintenance into a cycle program; (3) making the length of the cycle intervals consistent with the facility and type of maintenance

Territories graded to check progress

System officers on the PRR follow the progress of the programs for the main-line high-speed territory through track inspections made three times a year. The inspection party is accompanied by the local track, structures and signal supervisors, district engineer, regional engineers and engineers of maintenance over their respective territories. Actual unit costs are compared with the programmed costs.

A machine, mounted over the center sill of the rear truck of a business car, is used to grade the performance of each subdivision each trip. The machine measures the sudden impacts and jerks, and the horizontal and vertical movements and records them on a tape. Readings are taken over long distances and the total number of marks is added up and averaged. The number of miles and time elapsed between the beginning and end of each stretch are used to obtain the average train speed.

A formula ($10 - \frac{\text{Average marks per mile}}{\text{Average mph}}$) is then used to arrive

at a grade, with 10 being a perfect score. The results are then compared with those of the previous trip to reveal whether an improvement or deterioration in riding qualities had taken place. These findings are typed in statement form so that all concerned may be apprised of what is occurring on their territories. This information also is helpful in determining where efforts for future improvements should be made.

Since cycle track maintenance was initiated, the inspection trips reveal a more uniform ride and a more uniform rating between subdivisions, according to PRR officers.

nance required; and (4) programming the cycles.

A third objective was to increase the overall efficiency by: (1) Assigning the major portion of the force to a tight schedule of strictly programmed work; (2) retaining some arbitrary portion of the force for emergencies, other non-program work and work requests from other departments into the program in priority order; and (3) providing an efficient supply of materials through local purchases and direct contact with suppliers and also by eliminating the stockpiling and re-handling of materials.

A fourth aim was to increase productivity and efficiency of available manpower by: (1) Making the force as mobile as possible by use of highway trailers and rail-highway equipment; (2) decreasing lost time by parking trailers close to the job site and scheduling the work for short moves in sequence; (3) providing specialized or general-purpose equipment to do more work with fewer men per job; and (4) reorganizing manpower to provide more gangs with fewer men to fit the needs of the program.

To implement these objectives the road instigated a pilot program on one region and reorganized its B&B forces into small, highly mechanized gangs. The road also set up the work of this region with clear-cut programs and

budgets and authorized the purchase of a large proportion of the materials locally.

All items of work were included in the work programs. This involved not only regular maintenance but also capital-account items, joint facility jobs, inspections on state and federal projects and work originating in other departments. The work was scheduled on a consecutive location basis to minimize lost time in moving gangs.

Again the results were startling, and it was decided to revamp these forces on a system-wide basis as fast as the equipment could be financed. By September 1960, five of the nine regions had been fully mechanized. It is anticipated that all regions will be fully mechanized in 1961.

Most men of the B&B forces are now composite mechanics. This enables them to operate all the machines provided and to do all types of B&B work. The various phases of the mechanization and reorganization of these forces, as well as of the track forces, were discussed and negotiated with the Brotherhood of Maintenance of Way Employees.

The road reports that the response of the men in the field to mechanization has been very gratifying. More maintenance work is being accomplished and, for the first time in five years, the deferred maintenance items are being whittled down.

Rail is big item on PRR

Rail wear is rapid because of heavy wheel loads and the high density of traffic. As a result, the heaviest rail sections are used. Various means are used to prolong the service life of rail. In this category is the practice of cropping branch-line rails in track.



● Because of the heavy wheel loads and the tonnage carried, the Pennsylvania has always been a user of the heaviest rail sections. In fact, it pioneered the 140-lb, 152-lb and 155-lb sections. Today, it is still using the largest rail sections now being rolled—the 140-lb and 133-lb—for its new-rail programs.

Normally, the PRR has substantial new-rail programs, which have averaged 239 track-miles annually. In turn, the laying of this new rail has permitted the laying of many more miles of usable rail each year. In recent years, however, the reduction in earnings has made it necessary to curtail the amount of new rail laid.

But rail continues to be a big maintenance item for the Pennsy, and various means are employed to prolong its service life. These include rail cropping, out-of-face grinding, the

building up of rail ends by welding and the use of rail-and-flange lubricators.

Both new and secondhand (or "fit") rail is laid by three of the road's largest maintenance gangs. These gangs are inter-regional and are fully mechanized. Each is comprised of 84 men, including supervision, to which 11 more men are added by the local district on which the gangs are working (see table). It is organized to lay about 9,450 rail-feet per day, with 6 hr of on-track time. The gangs are housed in camp cars and use motor cars and trailers for transportation.

Although the request for rail usually originates with the local district, the rail to be replaced is inspected by the road's system inspector before a relay is included on any program. While in the field, this inspector makes a general classification of the existing rail so that a relay-rail program can be approximated. Sometimes it is necessary to relay some rail not requested by local supervision to obtain needed 39-ft relayer rails for curves. All recovered rail is sent to one of the road's three cropping plants where the 39-ft relayer rails are first separated and the

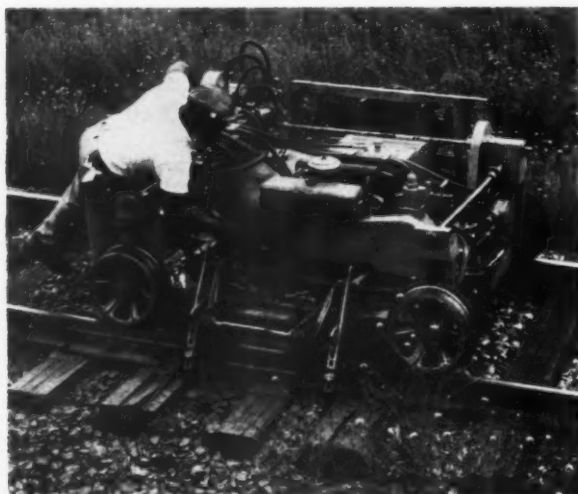
remainder are cropped. When cropping, 18 in are removed from each end. Cropped rail is used on the freight mains, secondary mains, branch lines and in yards.

At locations where the rail is showing some batter, but not enough to require cropping, the road builds up the rail ends by welding. This work is done by a district welding gang which includes from four to six welders. The joints are inspected and measured to determine the extent and amount of batter, then they are built up by oxy-acetylene welding. The welded ends are then roughly ground before reformed bars are applied; the road's tests have shown that some of the camber in the reformed bars will be lost if they are applied before welding. The rail ends are then finish-ground and cross-slotted. About 175,000 joints a year are built up in this manner.

Because of the severe wear of rail as the result of heavy traffic and sharp curvature, the PRR does not use new rail on many of the sharper curves in its mountainous territory. To get more service life from rail at these locations, the road transposes the rail from one side to the other. When the rail is worn out on these curves, 39-ft relayer rails are laid. This work is programmed and is done by the large rail-train gangs.

In 1960, the PRR found itself with several stretches on branch lines where the welded rail ends were chipping, which, together with fishing surface wear was creating excessive maintenance. To save the expense of laying new rail on the high-speed main

Crops rails in track with machines



RTW DRILL, completely hydraulic in operation, is a self-propelled unit for boring several bolt holes in rail simultaneously.



RTW RAIL CUTTER is self-propelled and has an abrasive wheel which is fed into the rail by turning a hand wheel.

lines for obtaining relayer rails for these branch lines, or of picking up, cropping and relaying the branch-line rail, the road decided to crop this rail in the track. It had pioneered this method in 1937 but had discontinued the practice because the costs involved made it uneconomical.

As revived, the practice of cropping rails in track involves the use of new or improved machines developed with the aid of suppliers. Key machines are gang drills, abrasive-wheel cutters and a unit for sliding the rails forward.

In brief, the work procedure consists of: (1) Marking the points where the rails are to be cut; (2) removing the rail anchors and joint spikes; (3) drilling two or more bolt holes simultaneously; (4) cutting the rail ends; (5) removal of the cut ends and chamfering the new ends by grinding; (6) pulling the cut rail forward to close the gap; (7) applying oversize reformed bars; and (8) reapplying the rail anchors and missing spikes. A filler rail of the same section and approximate wear is inserted every 10 rails to keep the rail-pulling operation within reasonable limits.

For this work the road uses a district gang comprised of a foreman, 6 machine operators and 4 trackmen. It reports that this procedure effects a saving of from 20 to 25 per cent compared with rail-renewal methods. Currently, the road has two rail-cropping gangs on its lines, one working on the Cumberland Valley branch of the Philadelphia region and the other on the Richmond branch of the Buckeye region.

Men and equipment for typical PRR rail-relay gang

Operations	Engr.					Equipment
	Fore-men	Equip. Wk.	Mach. Oper.	Trk.-men	Misc.	
Remove rail anchors				1		
Remove nuts			2			Nordberg wrenches (2)
Pull spikes			3	6		Nordberg spike pullers (3)
Remove remaining spikes				1		Gas cutting equip.
Remove joints, assist in removing spikes, pick up scrap				2		
Roll out rails, distribute plugs				1		Push car
Remove plates, clean cribs	1		1	3		Kershaw Kribber
Sweep ties, assist in driving plugs				1		
Drive spike stubs				4		
Set and drive tie plugs				4		Fairmont Tie-Plug Setter and Driver
Adz ties			2	1		Nordberg adzing machine
Apply creosote				1		
Throw in plates				3		
Set plates on ties				1		
Pregage, drill ties and distribute studs			2	1		Nordberg Dun-Rite Gager and Bronco
Set studs and drive				2		
Set in new rails	1	1		2		Burro Model 30 crane
Straighten plates under rails				1		
Oil rail ends, distribute bars and other material				2		Push car
Assemble joints				4		
Tighten bolts			2			Nordberg wrenches (2)
Drill ties			2			Nordberg tie drills (2)
Stick and start rail spikes			1	1		Racor Spike Setter
Set anchor and joint spikes				2		
Drive spikes			1	3		Racor Dual Spike Drivers (2) and spiking hammer
Drill rail, apply bond wires					2	Dual spindle drill
Set, apply rail anchors	1		2	1		Racine Applicators (2)
Straighten bent spikes, spike joints				1		
Hook up connections and relays					2	
Repair machines					1	
Watchmen				5		
Waterboy				1		
Cook and camp attendants					5	
Vacation and absentees				4		
Chauffeur					1	
General Foreman					1	
Totals	3	1	18	59	12 = 93	
From local district				5	4	
Inter-regional rail-gang force	3	1	18	54	8 = 84	

Note: Since gang has undisputed possession of track flagmen are not needed.



NCG DRILL has two sets of spindles for boring two or three bolt holes simultaneously in each rail.



NCG RAIL CUTTER also uses an abrasive wheel. It is manually fed into the rail and has an oscillating movement.

Except in terminals and at large interlocking plants, the section forces have been supplanted by specialized and highly mechanized gangs. Major track maintenance now is carried out under the cycle principle by district forces. Exception is the rail-relay program which is done by inter-regional gangs. Programs are carefully planned and executed.

Consist of heavy-maintenance gangs

Operation	Fore.	Asst. fore.	Mach. Oper.†	Trk.-men	Machine
Pull spikes, remove anchors			2		2 Fairmont spike pullers
Remove tie plates			1		Nordberg Power Jack
Remove ties	1		1		Fairmont Tie Remover
Pile old ties			1		RTW Tie Handler
Make tie bed			1		Fairmont Scarifier
Remove ballast under one rail and position new ties			1	2	Nordberg Gandy
Insert new ties			1	1	Fairmont Tie Handler
Place tie plates			1		Fairmont Rail Lifter
Set and drive spikes		1	1	4	PRR Nipper-spiker
Respace ties			1		P-S or RMC Tie Spacer
Distribute ballast			1		McWilliams Distributor
Raise and tamp joints and centers			1		Nordberg Tamping Power Jack or Kalamazoo Handyman, with Nordberg Trak-Surfacers
Raise and tamp low spots			1		Nordberg Midget Surfacers
Tamp track	1		1		Production tamper *
Line track		1	1		RMC LineMaster or Nordberg Trakliner, with Line Indicator
Level ballast			1		Kershaw Bal. Regulator
Maintain machines			1		
Watchmen				3	
Misc. work, incl. cook				4	
Total	2	2	18	14	= 36 men

†And/or engineer work equipment.

*Jackson, Matisa, Plasser, McWilliams, or Pullman-Standard tampers are used.

● As now organized, PRR's track forces are meeting the road's problem of getting greater production with less personnel. Program maintenance is carried out by highly mechanized gangs and as much of the non-program work as possible is being done with the assistance of machines. There are few section gangs remaining on the Pennsylvania and these are located in terminals and at large interlocking plants.

By the working season of 1957 sufficient machinery had been acquired to mechanize 16 raising-and-tie gangs. This permitted the adoption of the cycle-maintenance principle. Tie renewals on its main lines are made in connection with a track raise on a six-year cycle, and intermediate surface lifts are made every two years. This way, the high-speed tracks are worked every two years. For branch lines and yards, tie renewals and surfacings are made on an 8 or 9-year cycle, depending upon the traffic carried, with intermediate surface lifts at three-year intervals.

There are 16 districts on the Pennsylvania and two regions (New York and Southwestern) which do not have districts. Each is equipped with heavy-maintenance gangs, surface-lift gangs, spot-surfacing gangs, work-train gangs and skirmish gangs. All are housed in camp cars and are furnished trucks for the transportation of men and materials, with the exception of the large tie-and-raising gangs which have busses.

The inspection and patrolling of

Tie unit—heavy maintenance gang



TODAY'S heavy-maintenance gang organization is the result of a great deal of study by the road's Methods & Cost-Control group.



NEW TIES are pulled into position by a Tie Handler and rails are raised by a Rail Lifter to facilitate placing the plates.

r high production

track, formerly done by section gangs, is now handled through the supervisor of track by a number of track patrolmen. Each of the latter has the qualifications of a foreman and patrols from 40 to 50 miles of track. The track patrolmen are furnished for the most part with rail-highway jeeps but motor cars are furnished for branch-line patrol.

Each supervisor of track is assigned a "broken-rail" gang, comprised of a machine operator and two trackmen, for emergency and miscellaneous work. These units are each furnished with a truck having a hydraulic tailgate and carrying a power rail saw, power drill, 35-cfm air compressor, tamping tools and a 14-ft piece of rail drilled at both ends. In the event of a broken rail, a 14-ft section of the running rail is cut out and replaced with the emergency piece. The short lengths are then replaced at a convenient time with the assistance of a self-propelled crane and trailer car. These gangs also tamp up low spots and do miscellaneous work.

The supervisor of track is also assigned a welder and helper, a chauffeur and an engineer work equipment. To free the supervisor of many details to enable him to devote most of his attention to programmed work, the track patrolman assign work to both the broken-rail gang and to the welder. A patrolman may frequently pick up a man in his truck to take care of some small urgent work, then resume his patrolling. The patrolmen are regard-

CROSSING GANG handles the renovation of road crossings on a program which is dovetailed with other maintenance work.



ed as among the most important employees on the district.

The heavy-maintenance gangs make tie renewals, where they number 500 to 600 per mile, in conjunction with out-of-face raising and surfacing. These gangs, each comprised of 36 men, including supervision, complete from 2,500 to 3,000 ft of track per working day. Sometimes the equipment of these gangs, each set of which represents an investment of \$205,000, is worked in two shifts. The road estimates that each of these gangs must raise and tie 70 track-miles each year to keep abreast of this type of work. The men of these gangs are housed in camp cars. During winter months they work in yards, cut right-of-way brush and fight snow.

The surface-lift gangs give the track a 1½-in raise and tamp the track out-of-face. Each is comprised of nine men, including the supervision, and employs five machines with attachments. This equipment represents an investment of about \$105,000 per set. Productionwise, these gangs average about 4,800 ft of track per day each. The road has 42 of these outfits

which surface approximately 3,000 miles of track each year. In heavy-traffic territory, the road has worked these gangs at night, with lights on the wire indicators, with good success. They are housed in camp cars. These gangs also work in yards during winter and cut brush, fight snow, etc.

The spot-surfacing gangs correct the irregularities of track wherever the supervisor of track or track patrolmen finds improper conditions. Each is comprised of a foreman and two work-equipment engineers for operating the tampers. The foreman picks out the spots to be raised, sights the amount of raise, marks the limits on the ties, and the machines raise and tamp. Such work is not on a programmed basis because it is not known in advance where such low spots will develop. Hence, it is one of the maintenance items which the railroad wants to see reduced to a minimum.

The skirmish gangs might be termed "catch-all" gangs. They do work that is not programmed. Jobs of this category are the building of new tracks, taking up existing tracks, ditching, cutting brush with mechanical tools,



TIES ARE SPACED by a machine to eliminate skewed ties and to provide uniformity of bearing and track gage.



BALLAST DISTRIBUTOR moves ballast to where it is needed. It works ahead of raising and tamping operation.



SURFACE-LIFT GANG employs nine men to make a light raise and tamp out of face.



TRACK IS RAISED at joints and centers with raising tampo and wire device.



SURFACE irregularities between raising poles are removed with surfacing device.



Consist of surface-lift gang

Operation	Fore.	Asst. fore.	Engr. wk equip.	Mach. Oper.†	Trk.-men	Cook	Machine
Build up ballast shoulder				1			Kershaw Ballast Regulator with broom attachment
Raise track, joints and centers			1				Tamping jack* with Nordberg Trak-Surfacers
Raise and tamp low spots				1			Nordberg Midget Surfacers
Watchman					1		
Tamp track			1				Production tamper **
Line track		1		1			Nordberg Trakliner with Line Indicator
Level ballast and clean off tops of ties							(Same as first operation)
General supervision	1						
Maintain camp						1	
Totals	1	1	2	3	1	1	= 9 men

†And/or engineer work equipment.

*Kalamazoo Handyman, Nordberg Tamping Power Jack or Kershaw Jack-all.

**Plasser, Matisa, Jackson, McWilliams or Pullman-Standard tampers are used.

rehabilitating yard tracks, assisting work-train gangs in the distribution of material and picking up scrap, making joint-bar changes, handling tie renewals and surfacing on branch lines when it is not economical or feasible to move in a tie-and-raising gang, changing out defective rails found by the detector

cars or Audigage testing, and handling minor emergencies.

They are not furnished with any definite equipment, except a truck for transportation purposes, but are supplied with whatever equipment may be necessary for the work at hand. The skirmish gangs usually are comprised of a foreman and 14 men.

Crossing gangs, as the name im-

plies, handle the renovation of road crossings on a district programmed basis. Some of these gangs are equipped with a Road-Crossing machine and others will be equipped to the extent permitted by the road's finances. The gangs which have the machine also have small power tools and are comprised of a foreman and four men each. The gangs not having the Road-Crossing machine are comprised of a foreman and eight men each. The latter gangs have an air compressor with air tools at their disposal for tamping the ties through crossings, removing black-top surfaces, etc.

Work-train gangs are comprised of a foreman and seven men each. They unload ballast for the raising gangs, road-crossing timber panels, switch ties, rail and other track material for rail renewals and, during the winter, the cross-ties required for the following season's work. The men in the skirmish gangs, work-train gangs and heavy-maintenance gangs usually are pooled in the fall of the year and rearranged into smaller units to get the track ready for winter. Later, they handle the winter work.

Along with the section forces needed at the terminals and at large inter-

Types of tampers



MATISA SPEEDTAMPER is one of several types of production tampers used on the Pennsylvania.



PLOSSER TAMPER is another type which fits in with the particular needs of the Pennsylvania.



LINER with wire device assures accurate track alignment for high-speed operation and does not disturb the track surface.



BALLAST REGULATOR dresses the track. It also is used in advance of the gang for pulling ballast up to tie ends.

locking plants, a certain number of other men are allocated to each district. These men carry out such work as cleaning cars, serve as flagmen where the construction of state and federal projects require train protection, fill switch lamps and do janitor service.

Cycle maintenance requires careful planning. The initial program is initiated by the supervisors of track. It includes every conceivable item of maintenance that can be programmed. Such items include tie renewals, track raising and surfacing, rail relays, transposition of rail on curves, joint-bar renewals, track gaging, rail testing and grinding, building up rail ends, cropping rail in track, road crossing renovation, turnout repairs, taking up tracks, ditching, weed and brush control, etc. The program is made out in detail and, in addition, shows the work locations by mile posts, number of ties and additional ballast required, machines to be used, days required for the work, total costs and unit costs.

The costs shown are all-embracing. Labor costs are extended on an average rate which includes vacation time, welfare, retirement and unemployment benefits, thrift plan, injuries to per-

sons, medical care plan, and time paid for but not worked. Machine rentals are shown as well as costs for fuel and supplies, repairs and amortization.

These data are accumulated by the district engineers for each sub-district and submitted to the regional engineer. He, in turn, reviews this information, adds the regional overhead and any other items, then submits it to the system office. There, the information is consolidated and other items, such as ballast cleaning, rail trains, repairs to machinery, expenses incident to new work and capital expenditures, are also given consideration in making the total budget. The budget is then submitted to the System Finance Committee for approval.

The approved budget is allotted on a monthly basis. The monthly allotments are directly related to estimated revenues and vary from month to month in proportion to the traffic volume. Each month the regional engineers attend a budget meeting at the system headquarters and are given a total amount which each may spend for the following month. The regional engineers then revise their estimates to conform with the total allotted.

PRR maintenance officers have

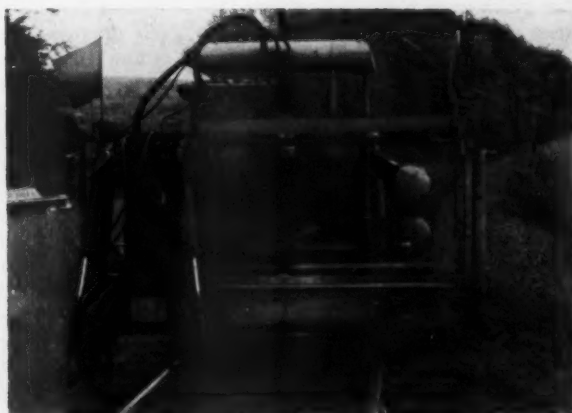
found out that the cooperation of the transportation department is an important factor in completing programmed work on time. To this end they have invited and escorted the superintendent of transportation and trainmasters out on the line to observe gangs without train interruption and others working under traffic. The difference in production is apparent.



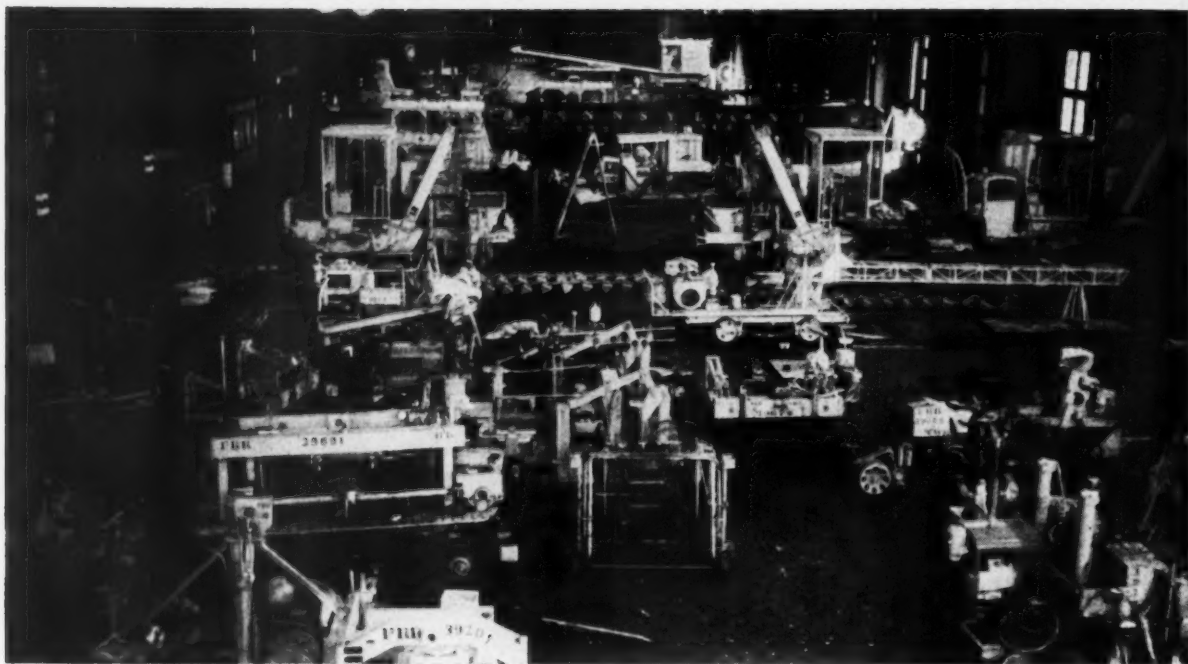
JACKSON TRACK MAINTAINER is used by one of the surface-lift gangs to set this branch line track up for the winter.



MULTI-GANG TAMPER of Tamper, Inc., has been used to some extent by skirmish gangs on branch lines.



MC WILLIAMS SPOT TAMPER is used by small gangs for correcting surface irregularities between out-of-face surfacings.



GENERAL OVERHAUL of the larger M/W equipment units is programmed to take place during the winter months. This view

shows M/W equipment repair shop at Logansport, Ind. Other such shops are located at Chambersburg, Pa., and Canton, Ohio.

Machines kept in tip-top condition

Always a leader in the use of roadway machines, the PRR makes sure first that it gets the right machine for the job. Then it programs both the work and overhaul of the units and provides a force of trained mechanics necessary to inspect and maintain them.

● Very early in the era of mechanization the PRR became a firm believer in the use of machines for M/W work. It has pioneered many machines, such as a ballast cleaner, a track sweeper for picking up front-end cinders, all-steel push cars, rail-grinding trains, a cable-coating device for lift bridges, ballast reclaimers, a tie loader and others. Today, the road uses more than 7,000 work-equipment units, which are valued at more than \$22,-067,000.

A number of practices have been adopted that are aimed at obtaining maximum effectiveness from this equipment. First, the road makes sure that the machine it is about to buy will do the work for which it is intended and will stand up under use with minimum breakdowns. Second, it programs the work and time the machine will be in use. And third, it



assures that the machine will be properly operated and maintained by providing a trained machine operator and an adequate force of repairmen for inspecting and making minor repairs in the field. Three shops for the general overhaul of M/W machines also are provided.

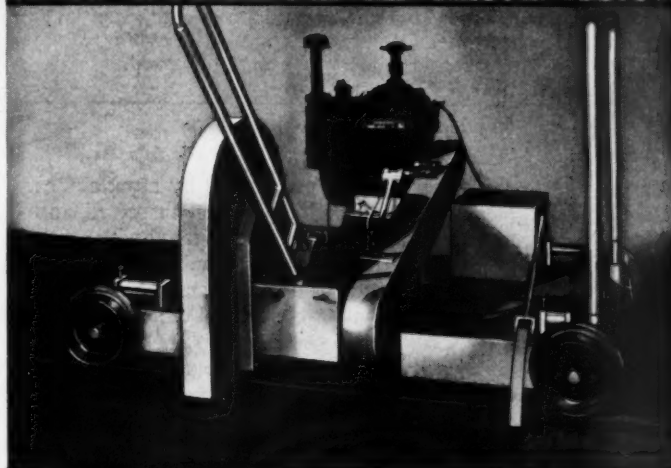
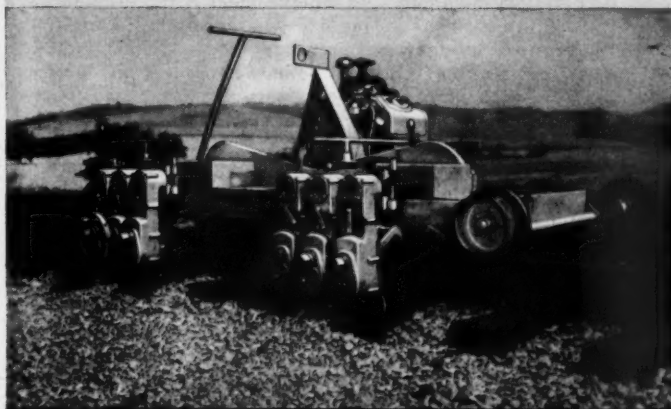
As superintendent of work equipment, C. F. Montague has jurisdiction over the assignment of all M/W machines to the regions. However, the regional engineers make assignments of the equipment within their respective districts. Mr. Montague also shifts the machines from region to region as the needs require. He arranges for the general overhaul of the ma-

chines, working from two work-equipment programs, one for summer and the other for winter.

During the off-season, most of the tie-renewal and production tamper equipment, as well as a considerable amount of other equipment, is brought into an M/W equipment shop for overhaul. Since weed burners are also used for melting snow and ice in winter, they are singled out in April and again in the fall for a quick overhaul. The winter program shows the machines to be overhauled, including for each unit the type of machine, the number of the particular unit and how long it will be out of service. Through such programs, the amount of money required can be computed and placed on the annual M/W budget.

The equipment-repair programs are prepared during meetings of the regional supervisors of M/W materials and work equipment in the spring and fall of the year. These men are given prior notice of such meetings so they can be prepared to say which units on their respective regions are in need of overhaul. Following each of these meetings, the general foremen of the road's three M/W equipment shops

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Now you can restore worn rail joints in-track to better than new with substantial savings in time, effort and expense. Working in tandem, the NCG 6-hole Rail Drill straddles a worn-out rail joint and simultaneously bores six accurately spaced bolt holes. Gone is the laborious drilling of each bolt hole. Then the NCG Hi-speed Rail Cutter crops out the worn joint section. In 60 seconds or less, it cuts a perfectly square, smooth rail end. The rails are pulled together, spliced, and the job is done.

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How machinery committee functions

Before a machine is bought by any of the PRR's nine regions, the unit must have the approval of the road's M/W Machinery Committee. This committee has functioned since April 1929. It is now comprised of 20 men who are drawn so that every one of the regions and system maintenance subdepartment is represented.

The committee meets every three months. A carefully considered agenda is prepared prior to the meeting and each member is given a definite assignment as a member of a subcommittee, comprised of from one to five members. The subcommittee investigates the device, machine or product and reports to the parent committee. Sometimes the members may go to another railroad to observe a machine in actual service.

The M/W Machinery Committee does not buy machines for the railroad. However, it decides whether or not a machine is satisfactory for use on the Pennsy. It may recommend that a machine or piece of equipment be purchased or rented in limited quantity for trial use on one or more regions. It may request that the M/W test organization make tests of the unit or that it be made a subject of study by the engineer of methods and cost control. It may recommend to the manufacturer that changes in design be made to adapt the unit to the road's needs. Or, it may recommend that the machine be approved for general use on the railroad.

Machines cont'd

(Chambersburg, Pa., Canton, Ohio, and Logansport, Ind.) get together with the superintendent M/W equipment to decide how the equipment to be overhauled is to be divided between the shops.

Generally speaking the decision as to which machines would be overhauled at each shop is mostly a matter of geography, with the machine being sent to the nearest point. About two years ago, however, a change in policy was made with respect to production tampers. Now the practice is to send these machines to the shop nearest the plant of the particular manufacturer. However, since the PRR uses four makes of production tampers and has only three shops, the work of overhauling all of the units of one manufacturer at one shop would place too large a load on any one shop the units made by this company are still apportioned on a geographical basis.

Because the bulk of the overhaul work is done in the winter, the number of men in the shop forces varies. In summer, the average work force at Chambersburg is 18 men, at Canton 24 men and at Logansport 20 men. These include, at each shop, a general foreman, an inspector of M/W equipment, a foreman, a clerk, welders,

M/W repairmen and their helpers. The welders all have the qualifications requisite for structural arc-welders.

If a field repairman finds that major parts which he can replace are required, he contacts his general foreman M/W work equipment, who orders the parts. If small automotive parts are urgently needed, the field repairman may obtain them locally. Each district has a general foreman M/W equipment who reports to the district engineer and supervises the work of the field repairmen and the maintenance and operation of all roadway machines and work equipment.

In winter the shop forces are augmented to fit the needs, partly with field repairmen who bid in on the shop jobs according to their seniority. This practice not only helps in maintaining a stable year 'round work force but it also gives the repairmen an opportunity to acquire expert knowledge on the care and internal component parts of the various units.

In general, the three M/W equipment shops are equipped with outdoor and indoor cranes, hoisting equipment, bench grinders, drills, hydraulic presses and related equipment. For the most part, they clean, change out parts and assemblies, make other repairs and paint the machines. Before a machine is brought into the shop,

it is first cleaned by a portable steam jenny. It is then inspected and the findings are compared with a field report. The hydraulic system is tested, the engine is given a compression test and the electrical circuits are checked and tested.

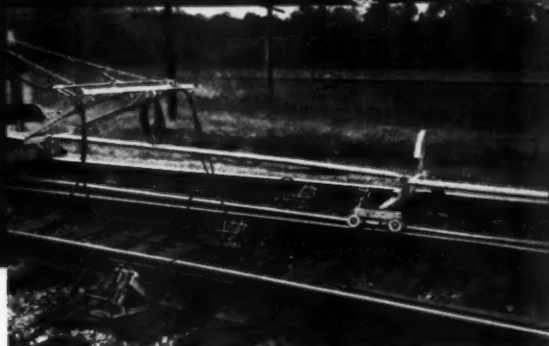
These tests determine what work is to be done. The card record of each machine also is reviewed to learn what repairs have been made in the past. Current repairs are entered on the card record before the unit leaves the shop and a report of the costs are sent to Mr. Montague for entering this information on the system record.

The field repairmen locate the causes and correct any difficulties in the proper functioning of the machines on their territories. When not "shooting trouble," they constantly inspect and adjust other equipment for preventive maintenance. Cranes are inspected every 30 days, motor cars every 90 days and other machines every 6 months. The repairmen make out a report for each machine they inspect, sending copies to the local district engineer and supervisor. When a machine must go to an M/W equipment shop for repairs, copies of a report showing the work necessary and notification of shipment are sent to the regional engineer, general shop foreman, district engineers and supervisor.

NEW NORDBERG

"Switchliner"

**makes quick work of
LINING TURNOUTS**



- ▲ Position of Switchliners depends upon how much track must be moved.
- ▼ Trakliner with "A" frame shown in raised position as normally used in lining open track.



Here's the latest Nordberg "Mechanical Muscle" to increase efficiency and lower costs on track lining operations . . . the new "Switchliner," a versatile "power assist" that makes quick work of lining turnouts and crossovers in either tangents or curves.

These new Switchliners, normally used in teams of four units, are accessories which are powered by the hydraulic system of any Nordberg Trakliner. Lining a turnout with the Switchliner is accomplished by placing them in the cribs under the rails. When lining at points where it is difficult to move the turnout, such as at the heel of a frog, all four Switchliners may be used to shift the track. At other spots, two may be sufficient.

Why not call or write today for further details, or to find out when these units will be working in your area.

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Mechanical Muscles®



Pennsylvania Railroad uses 10 **BANTAM RAIL-ROADERS®**

A BANTAM Rail-Roader is shown here completing a bridge modification job in Illinois. BANTAM Rail-Roader carriers are also used for mounting other equipment to handle maintenance of structures.



... to step
up mechanization
program ... speed
work schedules
on track and off
with "railroader's
handy man"!

BANTAM Rail-Roader® is today's versatile crane-excavator, the one machine of its kind that isn't tied down to just rails or roads—it works and travels both!

That's why the BANTAM Rail-Roader figures so importantly in fast-stepping programs of modernization and maintenance for railroads all over the country—it cuts down the amount of equipment needed, and makes manpower go further.

BANTAM Rail-Roader is the perfected on/off-track crane. Thousands of miles of travel and hundreds of different jobs have proved this one all-purpose machine with simple, retractable dolly-wheel mountings that quickly permit moving from road to rail and vice versa.

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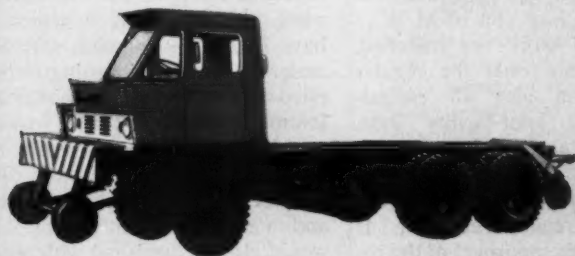
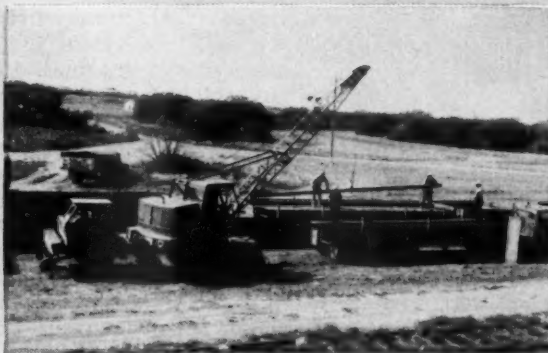
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RT-306

BANTAM RAIL-ROADER is the all-purpose machine ... does all kinds of work anywhere!

High-speed, on-track performance is provided by BANTAM's exclusive rail mounting design. Front and back retractable dolly wheels permit accessibility to any job. To go from road to rail, BANTAM Rail-Roader simply moves on track at any grade crossing. It's easy, fast, safe. Special high-speed reversing transmission gives up to 45 m.p.h. in reverse as well as forward.

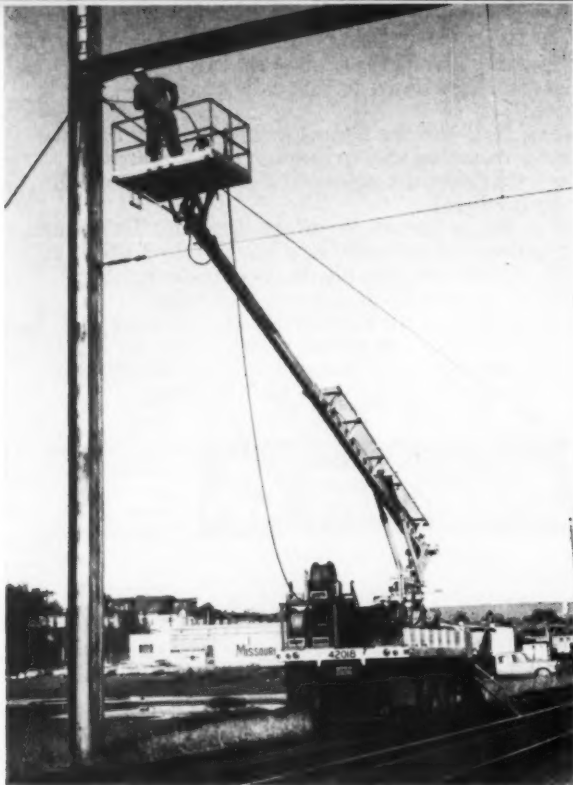
Unlimited working range. You name it—BANTAM Rail-Roader does it. Big capacity (now up to 11 tons), plus easy convertibility with 11 BANTAM-built attachments. You can handle lifting, excavating, loading, pile-driving or stock-piling jobs anywhere—on track or off. BANTAM optional remote control lets operator move carrier exactly as he wants—right from the crane cab.



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See Rail-Roader in action! Now is the time to see a showing of BANTAM's color motion picture which tells the complete BANTAM Rail-Roader story. See BANTAM in action on all kinds of B&B and track operations. Watch a step-by-step showing of modern ribbon rail setting using unique BANTAM Rail Threader (pat. pend.). Write for film details.



PAINTING of catenary poles in electrified territory has been cut from \$125 to \$35 per pole through use of modern equipment.

- Streamlined gangs
- Tailored mechanization
- Cycle maintenance
- Local purchases

... Cut bridge and building costs

Small crews, furnished with equipment for the specific work to be done, handle all bridge and building maintenance, even some construction work. Lone workers, traveling in trucks, handle jobs too small to be done economically by the gangs. New policy in material procurement saves much handling, provides the material when it is actually needed and reduces inventory.



● In 1961, it is expected that the bridge and building maintenance forces of the Pennsylvania will be fully mechanized on all nine regions. All B&B maintenance will then be carried out by small gangs equipped for the specific types of work each is to handle.

The gangs, including the foreman, range from 4 to 8 men each. The larger crews (more than 5 men) also include a cook. The men in these gangs are, for the most part, classified as composite mechanics and helpers so they can carry out all types of B&B work and also operate the machines. Only if a job requires five weeks or more to complete will these small gangs be bunched.

Work is scheduled on a cycle basis. For example, bridges are painted with protective coatings which are expected to last from five to seven years. When repairs to buildings are made, sufficient work is done to preclude the necessity of doing any more work on the structure for at least five years.

To accomplish the necessary main-

tenance, it is necessary that a program be made. This starts with the local supervisor of structures. He analyzes the work to be done at each structure and prepares estimates on a "family-tree" pattern, that is, the number of men for each gang is determined for the type of work it is to do, and below it is shown information relative to the equipment required. These "family-tree" estimates are developed in a conference attended by the assistant engineer structures-system, the district engineer, the local supervisor of structures, the general foremen, assistant supervisors and inspector of M/W.

All items of work are included. This involves not only the regular maintenance but also all capital-account items, joint-facility jobs, inspectors on state and federal projects, and work originating in other departments. The resultant plan is approved by the regional engineer. It also must have the approval of the regional manager and the chief engineer.

The local supervisor of structures then makes the final program of approved items. He also prepares several statements by which the progress of the work can be followed throughout the year. These show the number of gangs working on the program, the

consist of each gang, the various types of machines to be used, the estimated costs for labor, materials and equipment, divided by the various accounts, a comparison of these total expenditures with a preceding year, a work assignment for each gang and a list of the treated-wood, steel, spacing bars and paint materials required. The regional engineer then includes these work items and costs in his regional budget.

Where the quantity of a type of work is sufficient, gangs will be organized and equipped for this particular work. For example, a region may have 30 bridges to paint, with also a sealer and fireproof coating to be applied to the decks. In this event, a foreman and three men would be scheduled to do all this work. They would be assigned a Patton Bridge Sprayer outfit and screenings spreader and a set of Spider staging. They would also be furnished with air tools to assist them in this work and to clean the bridge bearings. A similar crew might be organized to paint catenary poles in the electrified territory.

Another crew of the same size might be assigned all of the main-line light masonry work, such as grouting, pointing and repairing deteriorated



BRIDGE PAINTING and deck coating are carried out by a foreman and three men using equipment tailored to these jobs.



RAIL-HIGHWAY CRANES are assigned to the small bridge gangs for handling all the heavy lifting.

masonry. This gang would be assigned a True Gun-All grouting machine for performing such work as grouting and pressure pointing, shotcreting and sand blasting. It would also be furnished with an air compressor with air tools and either a set of Spider staging or an aerial boom unit with rail-highway wheel attachment.

Roof and other building repairs, as well as painting, would be handled on a location-sequence basis by a crew comprised of a foreman and four men. It would be assigned a set of Grayco "PRR" package Hydra-Spray equipment, an aerial boom unit with rail-highway attachment, and a small electric generator with electric tools.

For heavy timber-bridge repairs, a foreman, five men and a cook would be assigned a Schield-Bantam rail-highway crane for lifting purposes, a Fairmont hydraulic Bridge Tool outfit and a pile driver. Another gang might be organized to handle other heavy masonry and steel-bridge repairs, such as encasing a pier with concrete, installing concrete raising blocks under steel spans, paving streambeds, raising wing and back walls, replacing of a span or entire structure, wharf and dock repairs, or tunnel work. This

(Turn to page 46)

TIMBER BRIDGE repairs are now made by small mechanized gangs. When working on timber trestles, each crew is assigned a Fairmont hydraulic Bridge Tool outfit, a rail-highway crane and a pile driver.



How PRR saves through B&B mechanization

Some striking savings have been effected through B&B mechanization. Spray painting, the use of grease-type coatings and aerial booms have produced some outstanding cost reductions. An example is the spray painting of the interior of the Harrisburg station. This work was completed at a cost of 4 1/2 cents per square foot, as compared with 19.4 cents per square foot by brush painting seven years ago.

The painting of catenary poles in electrified territory also is a case in point. This work formerly cost \$125 per pole. Four years later, the cost has dropped to \$35 per pole. By supplying house trailers for the painters instead of boarding them as heretofore, the road expects to get the cost down to about \$18 per pole. Since the number of poles average 20 per mile on 665 miles of electrified territory, the potential savings are substantial.

Bridge-painting costs also have taken a tumble. These costs now run about 3 cents per square foot for labor, equipment and materials. In the electrified territory, however, where protection is required because of train traffic, the costs run higher at 8 cents per square foot.

KERSHAW MACHINE

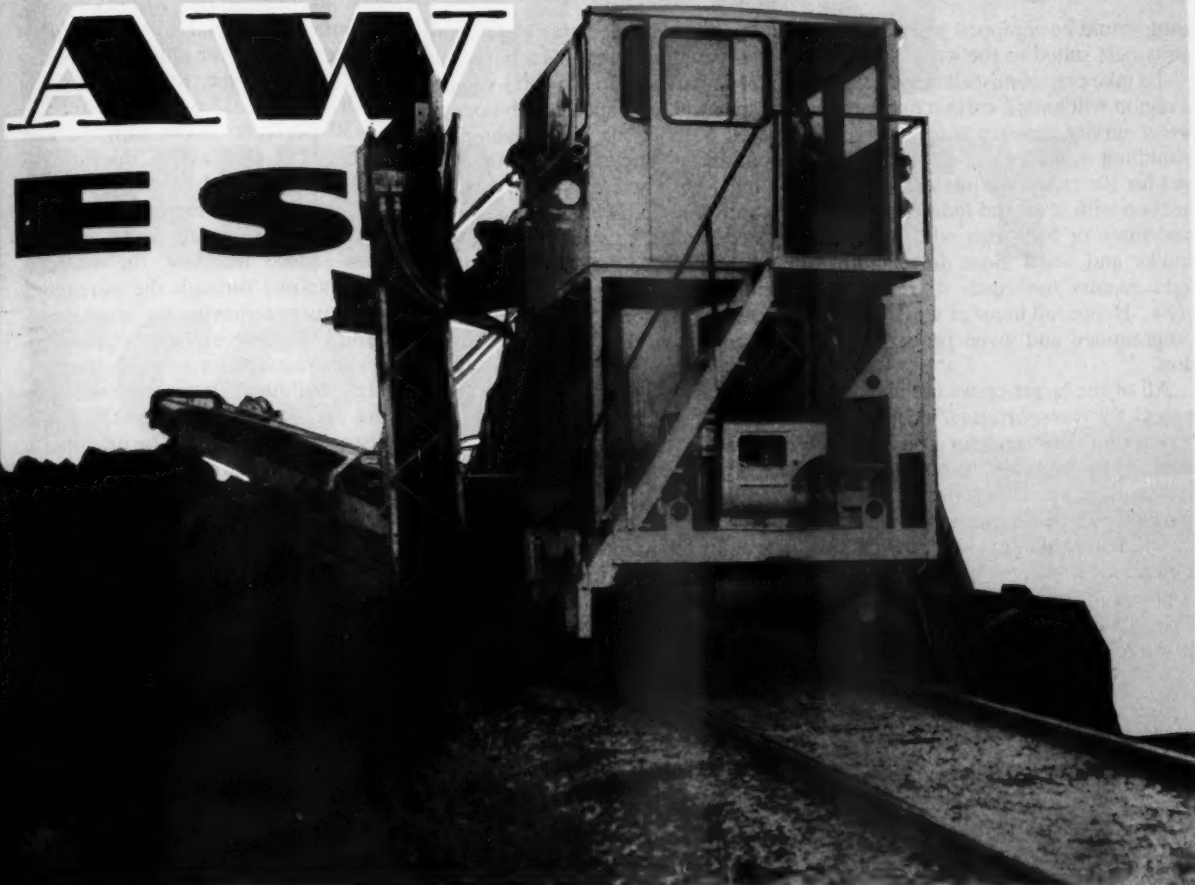
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**SKELETONIZING
BALLAST CLEANING
LOWERING TRACK**



The Kershaw Undercutter may be used to lower and to skeletonize track. The machine lowers track as much as four to six inches each pass, and is ideal for providing clearance in tunnels, bridge approaches, station yards, crossings and other places where clearance is a problem. Traffic may be maintained while track is being lowered.

AW ES



Kershaw Ballast Cleaner at work cleaning shoulder ballast.

**IF YOU HAVE A SKELETON-
IZING, BALLAST CLEAN-
ING OR UNDERCUTTING
PROBLEM, KERSHAW HAS
THE MACHINES TO DO THE
JOB AT A MINIMUM OF
TIME, COST AND LOSS OF
TRACK USE. WE RECOM-
MEND:**

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MANUFACTURING CO. INC.

MONTGOMERY  ALABAMA

P. O. DRAWER 1711

1. For Skeletonizing—Two Kershaw Two-Wheel Kribbers, working in tandem, and the Kershaw Tie-Bed Cleaner with Crib Cleaner.
2. For Cleaning Shoulder Ballast — The Kershaw Ballast Cleaner.
3. For Skeletonizing and Cleaning Ballast — The Kershaw Two-Wheel Kribbers, the Kershaw Tie-Bed Cleaner and the Kershaw Ballast Cleaner.
4. For Lowering Track and Removing Foul Ballast — The Kershaw Undercutter.
5. For Undercutting and Ballast Cleaning — The Kershaw Undercutter and the Kershaw Ballast Cleaner.

You May Utilize Any One Of Three Plans To Obtain Kershaw Machines:

1. Outright Purchase
2. Short Term Lease
3. Long Term Lease (3-5 Years)

Cut bridge and building costs *cont'd*

gang would be equipped with machine units best suited to the work.

To take care of miscellaneous work, a region will have a certain number of water-service repairmen to handle all plumbing work, an inspector to watch out for the railroad's interests in connection with state and federal projects and three or four men who travel in trucks and work alone for handling light repairs too small to require a crew. Hence, all items of work can be programmed and given proper attention.

All of the larger crews are assigned a truck for transportation. Also, highway trailers are used for housing the men and for tool cars. Both the trucks and trailers are either owned or acquired under leasing arrangements.

An important item in keeping maintenance expenditures low is a change in policy in the procurement of materials. One month in advance of the time a job is scheduled, the supervisor

of structures makes a check of the proposed work and prepares a bill of material for it. Where the total value of the material for a specific job does not exceed \$1,800, the bill of material is submitted to about three of the local building supply firms for quotations on all required materials, except treated lumber, exterior paints, dry cement and bridge grease-type and aluminum-filler coatings. The latter materials are ordered and obtained in carload lots by the purchasing department and are distributed by M/W supply cars.

The bill of material, together with the prices bid, is submitted to the regional engineer for approval. With his signature, the area storekeeper then issues a blanket requisition for the particular job and the order is placed. This order is valid for 90 days.

The road has found that \$1,800 worth of material is approximately equivalent to the requirements for a

job costing about \$5,000 for both labor and materials. Ordinarily this amount of material will keep a five-man gang busy for about 30 working days. In the past, the usual ratio of labor to material on B&B work was 70-30 per cent. Now with the high degree of mechanization, this ratio has been changed to about 60 per cent labor to 40 per cent material.

For jobs requiring more material than \$1,800 will buy, the materials are obtained through the purchasing department following the normal procedure. In general, such large quantities are required for long steel bridges, large buildings, large concrete jobs and major painting projects. In such cases, the materials can be procured at reduced prices when bought in large lots.

For minor repairs, the road's practice of permitting local purchase of materials under blanket orders ranging from \$25 to \$200 is unchanged. This enables a foreman to obtain locally small quantities of lumber, cement, sand, gravel, hardware, plumbing fittings, roofing paper, shingles, nails, screws, window frames and doors.

When such purchases are made the itemized bill is receipted by the foreman and sent to the local supervisor of structures. A copy of the invoice is forwarded to the area storekeeper, together with a receiving report and a charge-out report.

The new practice of allowing local acquisition of materials by the supervisor of structures has resulted in a reduction in the road's inventory of materials. Moreover, materials are delivered to the work site when needed. Breakage is replaced on the spot. There is little or no damage from weathering and pilferage is practically eliminated. More important, no unloading or rehandling of the materials is necessary by company forces.

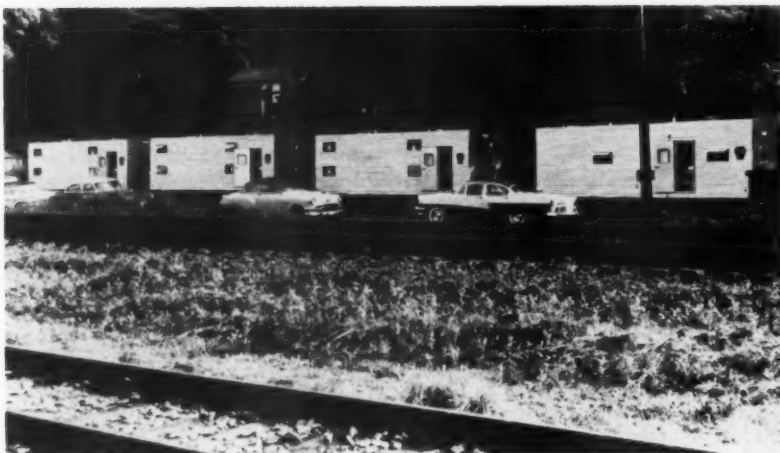
Work programs are followed carefully to see that the work is not falling behind schedule. Reports are made quarterly and the actual costs are compared with the estimated figures. Field checks are made promptly when costs vary from the budgeted figures.

An important source of savings in maintenance is the retirement of unnecessary buildings. On one line where eight stations were removed the agents were furnished with highway trailers to serve as mobile stations so they could transact business at two or three points.



**Trailers
for housing
B&B forces**

LEFT — Two Morrison units house two B&B gangs. BELOW — Four Atlantic units house three gangs assembled to work on a large project.



STRENGTH DURABILITY ECONOMY

THE IMPROVED GAUTIER RAIL ANCHOR

Here is one of the heaviest,
and most rugged, rail anchors
on the market. It is made
from alloy spring steel . . .

it is tough, durable, and
sure-gripping with plenty of
take-up so that it can be
used again and again . . .

it is applied with a maul or
spike maul and it can't be
overdriven. For Strength,
Durability, and Economy . . .

specify
and insist on the
Improved Gautier
Rail Anchor



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PENN CENTER DEVELOPMENT rises in the heart of downtown Philadelphia on the site of the old Broad Street station. Four new

buildings, representing an investment of over \$75 million, have already been completed and a fifth is under way.

Structures are many and varied

When it comes to structures, you name it—and the PRR has it. Its more than 10,000 undergrade bridges include just about every type of fixed and movable structure known to the railroad field, not excluding all-welded and prestressed-concrete spans.

Neither is there any lack of variety in buildings and related facilities. And here, too, there's always something new. One day PRR engineers may be grappling with the structural requirements of bowling alleys, another with air rights over railroad property.

● The rugged terrain served by the Pennsylvania and the network of highways intersected by its tracks have required an astounding number of bridge structures. There are 10,103 undergrade structures and 1,902 overhead bridges on this railroad. Streams account for 64 per cent and highways, streets and roads for 22 per cent of the undergrade structures.

There are 44 movable bridges over navigable streams. Most of these are located in the east, but 11 are in the vicinity of the Great Lakes and 1 is over the Ohio river at Louisville, Ky.



They represent every type of movable structure used in railroad service. There are 24 swing-type drawbridges, 12 vertical-lift spans, 7 of the bascule and roller-lift type and 1 shear-pole drawbridge. The 44 drawbridges each average over 2,000 movements annually. In addition, there are 18 transfer float bridges which are used for transferring cars to and from barges.



OFFICE for PRR TrucTrain terminal at Baltimore is provided by Atlantic trailer.

Many of the steel bridges were designed 50 and 60 years ago according to Coopers' E-50 rating. These are being upgraded by applying additional metal where needed by electric welding. All such work is carried out under traffic. Currently underway is the strengthening of 200 spans of the road's 30-year-old "High Line" bridge in Philadelphia. This work will be spread over a period of about 10 years.

Highway projects require a large amount of attention by the road's engineers. Currently, 86 such projects are under actual construction at a cost

GREATEST ADVANCES YET IN WEED AND BRUSH CONTROL!



New liquid **UROX**[®] gives 8 to 18 months control of weeds and brush!



New liquid **URAB**^{*} knocks out roots of brush, briars and weed trees!

General Chemical presents UROX and URAB—revolutionary new herbicides that enable you to control both weeds and deep-rooted brush faster, longer and more economically than ever before.

New liquid UROX is the first liquid substituted urea-type herbicide developed for railroads. It's fast-acting . . . burns back annual and perennial grasses as well as broadleaved weeds within 12 hours after application, regardless of weather. It's long-lasting . . . just one application wipes out weeds for 8 to 18 months. Effects are cumulative, too! Control can be continued economically year after year with small "booster" doses.

New liquid URAB—the *bulldozer* of weed killers—is an exclusive development of General Chemical. Unlike other herbicides, URAB is soluble in water, giving it a unique ballast and soil-penetrating action that

enables it to reach and kill the roots of tough, deep-rooted brush, briars, and weed trees.

UROX and URAB weed killers are ideal for railroad spray trains. They won't settle out . . . don't need continuous agitation . . . won't clog spray nozzles. Liquid UROX can be mixed with fuel oil, diesel oil or ordinary weed oils. Liquid URAB is completely soluble in oils or water. Both are available in granular form, too, for controlling weeds and brush in railroad yards, on spurs and sidings, around storage depots and other railroad installations.

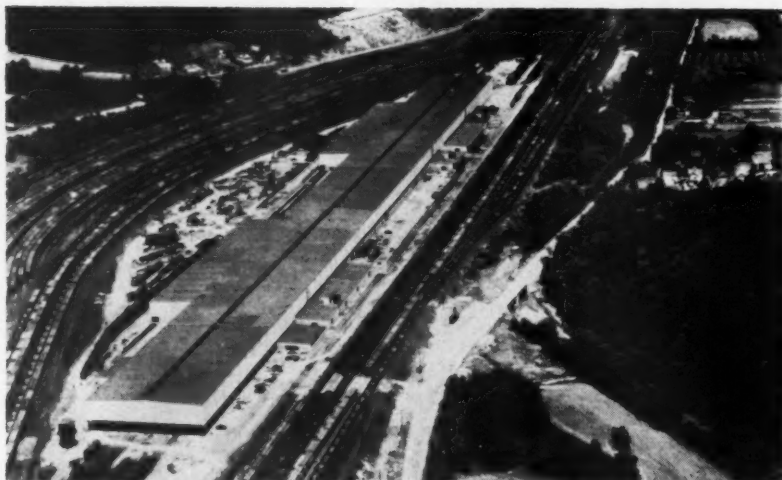
For complete information on revolutionary, new UROX and URAB weed killers, phone or write the nearest General Chemical office.

*Trademark of Allied Chemical Corporation



GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N.Y.

Structures are many and varied *cont'd*



CAR-REPAIR SHOP, said to house "the largest car-repair operation under one roof," was built by the Pennsy in 1955 at Hollidaysburg, Pa., at a cost of \$12 million.



ORE-UNLOADING PIER, built by the Pennsylvania at Philadelphia in 1954, has two unloading machines, each capable of handling 1,400 tons of ore per hour.

of approximately \$82 million, and 74 are under negotiation. One expressway project at Grand Rapids, Mich., necessitated the relocation of two railroad yards and portions of the main tracks, and the construction of a new yard, car-cleaning facilities, diesel-engine house and associated engine yard, a new office and scale and five overhead bridges to eliminate grade crossings, as well as the reconstruction of an existing overhead bridge.

One of the more recent bridge construction projects involved the erection of a 542-ft vertical-lift span over the Delaware river at Philadelphia, replacing a swing span of shorter length.

This project was carried out mostly under traffic with only three days' interruption to rail and river traffic. The new span was floated in on barges at high tide and allowed to settle on its supports as the tide ebbed.

Now under design is the Cal-Sag River project near Chicago which involves the rebuilding of a double-track swing bridge to provide a larger opening on a slightly different alignment. The movable span of this structure is being designed so that, if necessary, it can be converted to a vertical-lift span. Actual work is expected to start late in 1961.

Among recent projects is a pre-

stressed-concrete bridge. Erected late in 1959 it carries an industry track over another railroad in Baltimore. At this same point in 1955, the road built its first all-welded steel bridge. This span is 62 ft long. Designed for Coopers' E-72 loading, it carries five main tracks over Mulberry St.

Another unusual bridge development is the design of an all-steel emergency bridge to be used in the event of washouts or bridge burnouts. Detail plans have been made and the material has been assembled for such a structure for use when the occasion arises. It consists of H-piles supporting steel spans.

Among other types of structures the PRR has 480 passenger stations, 1,137 freight and combined freight-and-passenger stations, 9 water stations for servicing diesels enroute, 47 shop buildings, 54 enginehouses, 4 ore piers, 64 piers and wharves, 5 grain elevators, 336 interlocking towers and 60 tunnels.

Always more needed

New structures are constantly being added. For example, two warehouses for forwarding operations are now under construction. One is being built near 55th Street in Chicago at a cost of \$258,000 and the other is going up at Cleveland at a cost of \$127,000. Both are one-story, prefabricated-steel structures, with air-conditioned offices.

At New York a second-story addition to the road's existing 37th Street freight station is being built at a cost of about \$100,000. This addition is designed for IBM accounting equipment.

Calling for a knowledge of electronics as well as mechanics is the design of an automatic parcel sorter to be installed in the basement of a New York City post office. This is a \$225,000 project involving a system of conveyors with electronic devices and controls.

Two highly mechanized "one-spot" car-repair shops have just been completed at the road's Conway yard, Pittsburgh, at a cost of \$850,000. They are equipped with automatic car movers, built-in jacks which move laterally as well as vertically, auxiliary hoists and cranes, and other mechanical devices for expediting repairs. Plans for 22 similar installations are now under preparation.

(Continued on page 56)

Tamper MULTI-GANG^{*}

PACKAGE UNIT

- TAMPS
- JACKS
- LINES
- REMOVES TIES
- INSERTS TIES
- PULLS SPIKES
- DRIVES SPIKES
- BOLTS RAIL
- DRILLS RAIL
- TRANSPORTS MEN

PANORAMA  OF PROGRESS



A COMPLETE UNIT — three machines (or other equipment) are housed in Main Car.

EASILY REMOVED FROM TRACK by Greater Set-Off — in a matter of seconds.

POWER DOWNED OF INDEPENDENT WORKHEADS — operate easily.

HYDRAULIC PROPULSION ... Main Car travels up to 24 mph.

Tamper

TAMPER INC.

TAMPER LIMITED,

^{*} Your inquiries for detailed information on Multi-Gang and other track machines are invited.



Operation starts on new route

Work train "drags" ballast on Santa Fe's new 44-mile line change between Williams, Ariz., and Crookton. This line was put into operation December 19 by a train from Williams. Completed at a cost of about \$20 million, the new route will effect a saving of more than an hour in transcontinental freight schedules between these points, according to Ernest S. Marsh, Santa Fe's president.

More than 12 million cubic yards of rock and earth were moved in blasting the new line, utilizing nearly 600 men and 150 mammoth earthmoving machines for 16 months. Welded rail of 136-lb section and in 1440-ft lengths was used in the construction of the track (*RT&S* Sept. 1960).

The grades, alinement and track structure are designed to permit speeds of 90 mph for passenger trains and 60 mph for freights. Train operation is controlled by CTC of the traffic-reversal type which permits the faster passenger trains to overtake and pass the slower freights through strategically situated crossovers, then return to their original track.

News briefs in pictures . . .



Russians see our research

A Soviet railroad delegation, escorted by W. M. Keller, AAR vice president, and G. M. Magee, AAR director engineering research, had a field day at the research center located on the campus of Illinois Institute of Technology, Chicago. Cameras clicked, innumerable questions were posed and copious notes were made. One lab technician said: "We had to practically drag them from some of the tests."

Armco gets new trademark

The new trademark being viewed here by L. T. Johnston, Armco's president (seated), and W. B. Quail, vice president, was adopted only after much study. An industrial firm was hired for an overall appraisal of Armco's identification methods. The new trademark design "introduces higher style and modern visual expression," said Mr. Johnston, and "is in keeping with our continuing program of corporate development."

Look what you get when you specify Unit Rail Anchors!

*More **RUGGED**
in Every Respect*



HOLDING POWER

No anchor has more holding power than the Unit—and few are its equal! Superior for welded rail.

REAPPLICATION VALUE

No anchor retains more holding power than the Unit on repeated application.

ECONOMY

Compare the performance — then check the cost — and realize a worth-while saving from Unit Rail Anchors. Best for machine application.

SAFETY

With the Unit Rail Anchor there's less likelihood of damage to rail and/or anchors in event of derailed wheels.

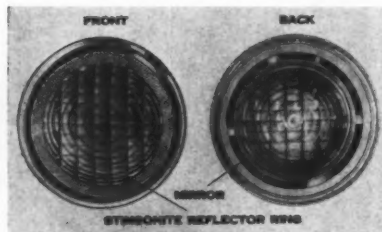


UNIT RAIL ANCHOR CORPORATION

6301 Butler Street, Pittsburgh 1, Pa.

Midwest Office: 332 S. Michigan Ave., Chicago 4, Ill.

Eastern Office: 790 Broad Street, Newark 2, N. J.



NEW PLASTIC switch lamp lens is designed to provide increased light transmission and improved light distribution.

Acrylic plastic lens for . . .

Switch lamps

A NEW Stimsonite acrylic plastic lens for switch lamps has been announced by the Elizabeth Division, Elastic Stop Nut Corporation, Elizabeth, N. J. The lens manufacturer has appointed the Primary Battery Division, Thomas A. Edison Industries, McGraw-Edison Company, Bloomfield, N. J., as distributor of replacement lenses to all railroads. The new lens will be available from leading switch lamp manufacturers for installation in new lamps when specified.

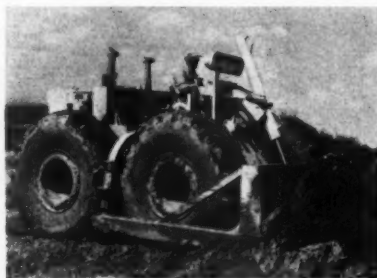
Features claimed for the Stimsonite lens include increased light transmission, improved horizontal and vertical light distribution and high impact resistance. The lens is designed in accordance with AAR specifications and consists of two molded acrylic sections hermetically joined together. The internal optical elements are permanently sealed against dirt and moisture.

The edge of the lens is equipped with a circular reflector ring for the purpose of improving the long-range efficiency of the switch lamp. In addition, the reflector provides standby safety in event of lamp failure. The back of the lens in the reflector area contains a highly polished surface which redirects unused light through the opposite lens to increase its total light output. The new plastic lens is available in red, green and yellow and is designed to replace the 5-in and 5½-in diameter glass lenses in oil or electric switch lamps. The manufacturer claims that the Stimsonite lens may be used where either optical or 30-deg spread-light lenses are presently used due to its improved horizontal and vertical light distribution. *Primary Battery Division, Thomas A. Edison Industries, Dept. RTS, Bloomfield, N. J.*

Hydraulic system for . . .

Tournatractor

A NEW L-W Model C Tournatractor is available which is equipped with a high-pressure hydraulic system for the operation of attachments. Announced as a compan-

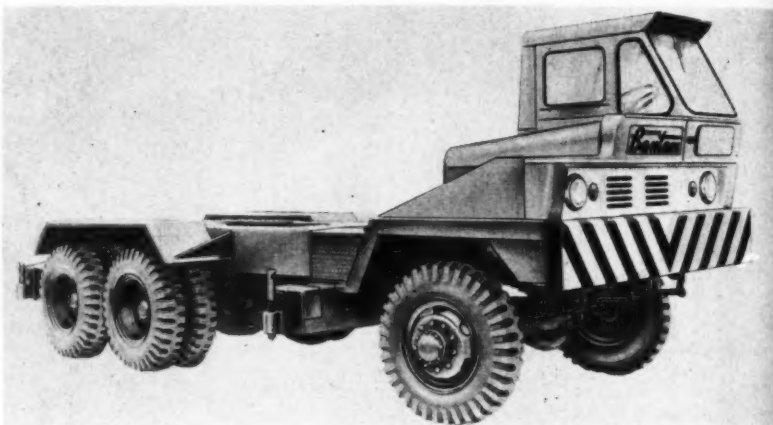


ion unit to the Model C Tournatractor with electric controls, the new machine utilizes a 5,000-psi hydraulic system, a direct-drive, Dynex piston pump instead of the usual vane or gear-type pump and two slide valves

in the control system instead of a spool or poppet valve. The immediate buildup of pressure when the slide valves are opened is claimed to give faster, more positive response of the blade.

The new C tractor is powered by a 218-hp engine and is equipped with the L-W power-shift-type transmission. It has four speeds forward and a top speed of 18.3 mph. The tractor has been shortened 18 in to an over-all length, without blade, of 13 ft 6 in. Over-all width is 10 ft 6 in. The unit is equipped with a 1400-rpm power take-off for the operation of towed equipment.

A new dirt-handling C blade is available for use with both Model C Tournatractors. It is 13 ft long, 3 ft 9 in high and weighs 5,000 lb. The blade has a maximum pitch adjustment of 12 deg. *LeTourneau-Westinghouse Company, Dept. RTS, Peoria, Ill.*



New unit added to line of . . .

Crane carriers

MODEL 406 has been added to the Schield Bantam line of crane carriers. The sixth Bantam-built unit in the line, the new carrier was designed for the mounting of the 11-ton capacity Model T-350 upper unit. It is claimed to provide maximum stability when the upper unit is equipped with a long

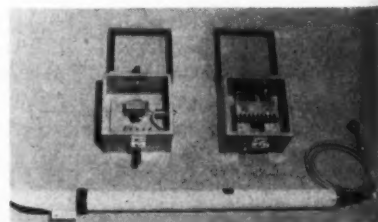
boom. The new heavy-duty 6x6 unit has a 15-in by 6-in box-section frame, an all-vision, one-man operator's cab and a transmission that provides five speeds forward and one reverse. Standard equipment includes a 220-hp, V-8 gas engine, power steering, air brakes on all wheels and 9.00x20, 10-ply tires. Center and rear outriggers are available as optional equipment. *Schild Bantam Company, Dept. RTS, Waverly, Iowa.*

Detect changes with . . .

Photo electric system

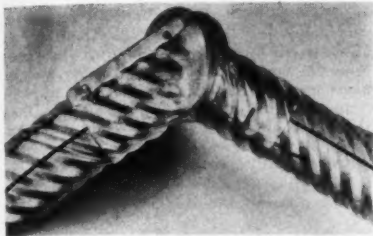
UTILIZING a photoelectric cell and a telescopic light sensing unit, the new Rails Photo Electric System is designed to detect the position of objects by variations as small as ½ in. It is claimed that the sensitive system can operate for distances over 100 ft with the telescope and up to approximately 30 ft without the telescope.

The manufacturer states that the system can be used for control and indicating functions in yards, at bridges and at sim-



ilar locations. The system can be set up to de-energize if the object, equipment or device is too low or too high by as little as

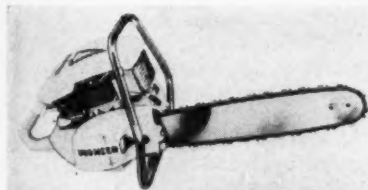
1/2 in. The operating relays integral to the system are normally energized. The Rails Company, Dept. RTS, 187 Maplewood Ave., Maplewood, N. J.



For perforated pipes . . .

Universal joint

A NEW four-piece universal joint is available which permits sections of perforated drainage pipe to be joined at any angle from 0 to 90 deg. Known as Band-Ell, the joint has been developed for use with 6-in. Hel-Cor perforated pipe. The sections of the joint are interlocked and are fastened to pipe ends with either bolts or wedge fasteners. The desired angle can be attained by varying the location of the flanges in relation to the top of the pipe. The manufacturer states that the new universal joint remains tight through earth shifts, frost upheavals and heavy flow. *Armco Drainage & Metal Products, Inc., Dept. RTS, 9360 Curtis St., Middletown, Ohio.*



THE MODEL 610 Pioneer chain saw is a heavy-duty machine for professional use.

New models introduced . . .

Chain saws

TWO new models in the 1961 line of Pioneer chain saws have been introduced. One, known as the Model 410, is a continuation, with improvements, of the Pioneer 400 series. It is stated to be an all-new, compact, high-production unit. The other new model is the 610. It is a heavy-duty, high-production chain saw for professional use.

Both models are constructed from lightweight, high-strength, weldable aluminum alloy and are powered by 1-cylinder, 2-stroke piston engines. The engine of the 610 features larger engine components than the 410. The latter is equipped with the Insto-Primer which is a device for injecting fuel into the firing chamber with a flick of the thumb. The Model 610 is equipped with a rear handle which has been designed for firm grip with maximum comfort and minimum fatigue. Match-mated attachments for both units include a variety of cutter bars and chains. *Outboard Marine Corporation, Dept. RTS, Waukegan, Ill.*

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One call to Foster delivers the exact steel piling you need for your maintenance of way programs—at fixed, low rental rates. You'll get the exact sections and lengths of steel-sheet piling when you use Foster's Piling Rental Plan, "plus" prompt deliveries of all standard sections, connections and driving accessories.

Foster Lightweight Steel Piling offers safety at savings for light-load excavations. It is the strongest made and reduces job costs, because it's so easy to handle and needs no special driving rigs, "plus" . . . you can rent it on Foster's Piling Rental Plan.

Call the Foster specialist for help with your sheet pile requirements and information on Foster's pipe pile service.

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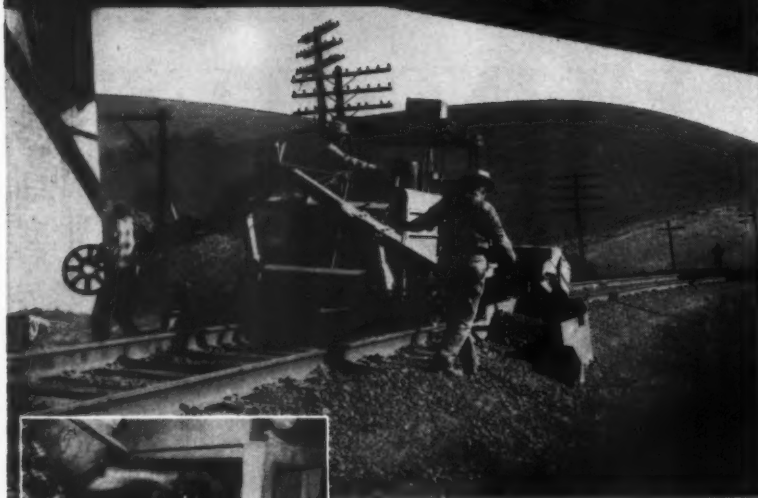
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Southern Pacific Uses Aeroquip Hose On Maintenance-of-Way Equipment



The Ballast Regulator is typical of machinery equipped with Aeroquip Hose Lines.



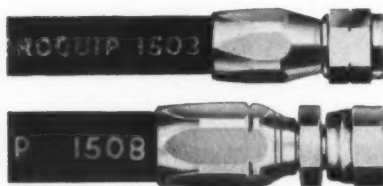
Ballast Regulator hose lines made up from Aeroquip 1503 Hose and Reusable Fittings are easily replaced in the field.



New Aeroquip 1508 and 1503 Hose Lines have been installed on this tie inserter.

Many leading railroads have found Aeroquip Hose Lines with Reusable Fittings meet the test under the year-round demands of maintenance-of-way equipment. For air, hydraulic and fuel line applications, Aeroquip gives quality performance.

Aeroquip Hose Lines offer quick replacement when necessary on any piece of equipment. Hose lines are field assembled from a small supply of bulk hose and reusable fittings. For dependable service and speedy maintenance, specify Aeroquip. Call your Aeroquip factory representative, or write us.



1503 Single Wire Braid Hose with Reusable Fittings for medium-pressure hydraulic and engine lines.

1508 Multiple Wire Wrap Hose with Reusable Fittings for extra-high-pressure hydraulic and pneumatic lines.



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A question and an answer

Looking for the "What's the Answer?" department? It'll be back next month. It was omitted from this issue to allow more space for the special report on the PRR. Questions to be answered in February and March were published in earlier issues. Given below are the questions to be answered in the April issue.

Answers are solicited from readers. They should be addressed to the "What's the Answer?" editor, Railway Track and Structures, 79 W. Monroe St., Chicago 3. An honorarium will be given for each published answer on the basis of its substance and length.

To be answered in the April issue

1. Based on your own experience and not on theory, how small can a tie plate be and still be better than no plate when used on light-traffic branch lines? Explain.

2. When replacing bents in timber bridges, what is the best and most economical sequence of driving the piles? Why? (In answering this question, refer to pile No. 1 as the one on the extreme left and to pile No. 5 or 6, as the case may be, on the extreme right as you face the direction of increasing bent numbers.)

3. What factors determine when joint bars should be renewed out of face? Explain. What instruments or tools are necessary for conducting a joint-bar inspection for this purpose?

4. What are the best methods for obtaining full bearing under bridge shoes on new bridge seats? On worn bridge seats? Explain.

5. Where field mechanics are assigned to tie-and-raising gangs, what basic tools and equipment should they have in their cars? Describe in detail. What other tools and equipment are desirable?

Structures *cont'd*

(Continued from page 50)

Success of the PRR's TrucTrain operations has given impetus to the construction of loading ramps, truck-manuevering areas and yard changes at various points. Currently under way are two such projects, one at 58th street in Chicago and another at Kearny, N. J. A third is under study for Columbus, Ohio.

Another type of project is one involving extensive repairs and alterations to a covered pier at Greenville, N. J. Its purpose is to consolidate lighterage operations presently handled at Greenville and Harsimus Cove. This project, which will cost \$250,000,

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now read about the most
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the NEW **MATISA** *hydraulic "60"* SPEEDTAMPER



**TAMPING UNIT DOUBLE
CLUTCHES ELIMINATED...NOW
CONTROLLED BY REVERSIBLE
HYDRAULIC MOTORS!**

Less Wear on Man and Machine. Hydraulics eliminate shock loads, gears, clutches. Eliminate fatigue on man and metal!

Less Maintenance. Fewer costly gears and parts to buy—or wear. Less repair time, lower

maintenance cost. Standard American components and parts.

More Production. Hydraulically positioned tamping units provide positive action, speedy operation. Assures maximum production.

Safe—Quiet. V-Belt drives with multiple disc clutches eliminate gears and noise, reduce maintenance and serve as safety clutches.

Fast—Efficient. Instantaneous split-head operation increases speed and production for both spot surfacing and out-of-face work.

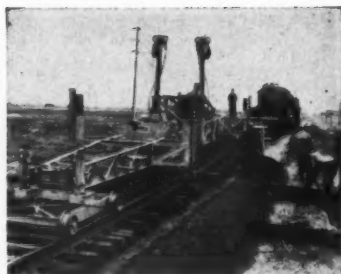
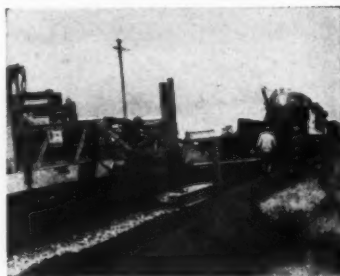
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NOW... Plow, Remove Worn Ties, Sled Ballast and Align a MILE of Track a Day with MANNIX AUTO-TRACK



Plowing and removing worn ties is done at the head end of the MANNIX AUTO-TRACK. Worn ties are automatically ejected by conveyor.

Aligning unit at rear of MANNIX AUTO-TRACK keeps track in rough alignment behind plow, accurate alignment behind sled.



Sled replaces plow to place ballast under ties. This track was raised five inches.

MANNIX AUTO-TRACK eliminates 15 to 20 men, finishes a mile or more of track per day. For details or showing of operating films write, wire or phone TODAY. No obligation.



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Structures cont'd

includes the construction of a new truck dock, office and welfare facilities.

Big tanks boost fuel storage

An interesting project recently completed came about because of desire to provide sufficient storage for fuel oil so that substantial savings can be made by buying this commodity in the summer when prices are lower. Eight large steel storage tanks were constructed at four strategic points at a cost of \$2.6 million. The result was an increase in the total fuel-oil storage capacity of 50.9 million gallons.

Two tanks, 120 ft by 48 ft in size, added 8 million gallons at Conway, Pa. Four more were built at Cincinnati, adding a capacity of 16 million gallons. At this point two tanks, together with barge-unloading facilities, were constructed on the bank of the Ohio river and connected by a 4-in pipe line to two new tanks built at the road's Undercliff yard, at Pendleton, two miles distant, where a 20-car distribution system also was constructed. Two other tanks were constructed at St. Louis, adding 8 million gallons capacity, and three more tanks, 150 ft by 48 ft in size, at Philadelphia, added 18.9 million gallons. Tanker-unloading facilities were constructed at the latter point.

An entirely new problem for railroad structural engineers was created when the Greyhound Bus Line moved out of the road's 30th Street station in Philadelphia. To produce a new source of revenue the west wing of this facility was remodeled and 30 bowling alleys installed at a cost of \$750,000. The alleys are operated under contract day and night and have proved a successful business venture.

Building Penn Center Plaza

One of the largest improvement projects ever undertaken by a railroad was the planning and construction by the PRR of Penn Center Plaza in Philadelphia. Actual work on this project started shortly after the last train departed from historic Broad Street station in April 1952. One of the first steps was removal of the embankment, known as the "Chinese wall," carrying the tracks that connected this station with the 30th Street

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KILLS ALL Vegetation • Stops New Growth
Ready to Use • Nothing to Add • Easy to Apply

CHLOREA GRANULAR is a pelletized combination of 3 proven chemicals. This combination kills deep-rooted weeds and grasses; also shallow-rooted grasses, weeds and annual seedling growth.

CHLOREA GRANULAR is particularly intended for use in locations where large scale spray application is impractical . . . such as freight yards, terminals, storage yards; under bridges and trestles; around warehouses and stations.

CHLOREA GRANULAR pellets are easy to apply with any mechanical spreader used for granular materials, or may be broadcast by hand.

CHLOREA GRANULAR is effective at low application rates . . . about 400 pounds per acre; less where only annual vegetation is involved.

CHLOREA GRANULAR has demonstrated its powerful kill-all effectiveness in extensive use on many leading railroads.



**This small amount kills
over 50 square feet of
weeds and grass . . .
400 lbs. treats an acre.**

Send for FREE Sample Packet and Illustrated Folder

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Dept. A1, Bound Brook, New Jersey

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WORLD LEADER IN CHEMICAL WEED CONTROL SINCE 1912

RAILWAY TRACK and STRUCTURES

JANUARY, 1961 59



make money on the job with **Campcars**

Campcars are money-saving mobile campsites. Easy and economical to transport. They'll house from 2 to 50 men maintenance crews right on the job comfortably, efficiently. Ruggedly constructed for rough on- or-off highway travel. They are good for years of service, yet in many instances have paid for themselves in one year. Forget high hotel costs, terrific to-and-from-the-job travel costs. Remember to write today for the lowdown on low cost, high crew-morale-building Campcars. International Car Division, 2485 Walden Avenue, Buffalo 25, N. Y.



INTERNATIONAL CAR DIVISION



Campcars

A SUBSIDIARY OF RYDER SYSTEM, INC.

Structures cont'd

station. Since then, various underground passageways, three major office buildings (including the road's own general offices), an apartment building, a hotel and an underground plaza have been constructed. Also included were an ice-skating rink, two restaurants and six stores. Presently under construction are a subway station and two additional stores.

Now under study is a proposal for making changes to Penn Station in New York that will permit the air space over this historic landmark to be utilized for commercial structures.

Another major project under study is the rehabilitation of the road's Chautauqua branch between Oil City, Pa., and Buffalo, N. Y. A separate engineering force stationed at Corry, Pa., is obtaining the necessary field data. This project involves the upgrading of the track, grade and curve reductions, the installation of a CTC system and the construction of additional yard tracks and other facilities. It was made necessary by the abandonment of a portion of the road's Salamanca branch incident to the construction of the Allegheny reservoir by U. S. Army engineers. This rehabilitation project is expected to cost several million dollars.

Other jobs under study include the converting of an enginehouse at Altoona to diesel operation, and the conversion of a manually operated hump yard at Altoona to automatic operation.

To the editor

**Says NRAA March show
will be 'largest and best'**

Chicago

TO THE EDITOR:

The National Railway Appliances Association appreciates your timely editorial concerning the American Railway Engineering Association convention to be held next March.

Our exhibit at McCormick Place will run concurrently with their meetings at the same location, and early indications are that this show will be by far the largest and best ever produced.

With one-third of our regular exhibitors remaining to be heard from, over 80 per cent of the entire exhibit area has already been reserved. This is more exhibit space than was provided previously at the Coliseum for the whole show.

The entire membership of National Rail-

Spikes set up straight and true by the Racor Dual Spike Setter are firmly, quickly driven by this Racor Dual Driver.



This Racor Spiking Team can do the work of a dozen men

RACOR DUAL SPIKE SETTER AND RACOR DUAL DRIVER CUT COSTS, SPEED RAIL LAYING, AND IMPROVE TRACK

Once, as many as twenty-one men were required to set and drive spikes. Now nine can do the job better and faster than ever before with the new Racor Dual Spike Setter and Racor Dual Driver doing the work of twelve men. Just one or two men are required to position spikes ahead of the Racor Dual Spike Setter which moves in, vertically aligning each pair of spikes and setting them straight with a single, always accurate blow from an air hammer. The Racor Dual Driver completes the job, driving two spikes at once quickly and uniformly. It can also be used to drive Racor studs for better line and gage holding, and wear reduction. As a result this equipment pays for itself in just a few months through faster spiking, smaller spiking crews, easier operation, uniform spiking, and reduced maintenance and down time.

See your American Brake Shoe representative today for complete details on how the Racor Dual Spike Setter and Racor Dual Driver can bring major savings to your road.



A-2994



RAILROAD PRODUCTS DIVISION
530 Fifth Avenue, New York 36, N. Y.
In Canada: Dominion Brake Shoe Company, Ltd.



NEW! the BIG-BOY Rail-Road CONVERSION UNIT WEED CONTROL TEAM!

Specially-designed Rail-Road equipment now provides proper application of all weed control chemicals along right-of-way or highway. The new sprayer truck features a 3,000-gallon tank with paddle plus hydraulic agitation and includes replacement power hopper for the handling of dry herbicides. Hydraulically operated spray booms—controlled from inside cab—allow up to 30' "on-track" spraying width. Solenoid operated electrical valves provide instant cutoff of spray. High-capacity brush turret on top of tank gives full treatment range to troublesome brush spots. Unit operates at 12 MPH on rail; works equally well along shoulder, access roads, in yards, etc. Ideal for terminal use.

The husky Big Boy Rail-Road Conversion Unit provides on-track/off-track operation for vehicles up to 50,000 lbs. GVW. Eight self-steering wheels with bogey action provide better performance on uneven track, increase on-rail safety, eliminate curve binding and reduce vehicle strain. Getting on, or off, rail at handy road crossings is an easy, one-man hydraulic operation with the Big Boy. Simple, foolproof and SAFE, it is ruggedly constructed for years of trouble-free service.

SHOWN ABOVE: The new Rail-Road Sprayer Truck mounted on CDF-192 International tandem drive chassis, 48,000 GVW. A wide selection of truck sizes and tank capacities is available. Further information and prices on request.

CALL OR WRITE FOR BULLETIN NO. 61-T.

W. T. Cox Company

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Sylvester Distributors Ltd.
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Chicago 6, Illinois

To the editor (cont'd)

way Appliances Association is going all out to have the greatest exhibit ever, and we sincerely hope the railroads will join us in increased attendance which we believe will indicate to everyone that the railroad and associate industries are constantly forging ahead along the lines of mechanization.

Kenneth Cavins
President
National Railway
Appliances Association

The editorial mentioned by Mr. Cavins appeared in the December issue. Entitled "The AREA meeting—A question of economics," it raised the question whether the AREA could afford not to hold an annual meeting, especially when an exhibit of manufacturers' products is scheduled to be held in conjunction with it. The editorial related a series of events that began when the AAR "suggested" that its subsidiary groups consider cancelling their 1961 annual meetings. It went on to summarize reasons put forward by Mr. Cavins for not cancelling the AREA meeting and the NRAA exhibit scheduled to be held in conjunction with it. Finally, it brought out the fact that the outcome was a decision by the AREA Board of Direction, later approved by the AAR, to proceed with its plans for an annual meeting in March 1961.—Editor

Biographical briefs

(Continued from page 10)

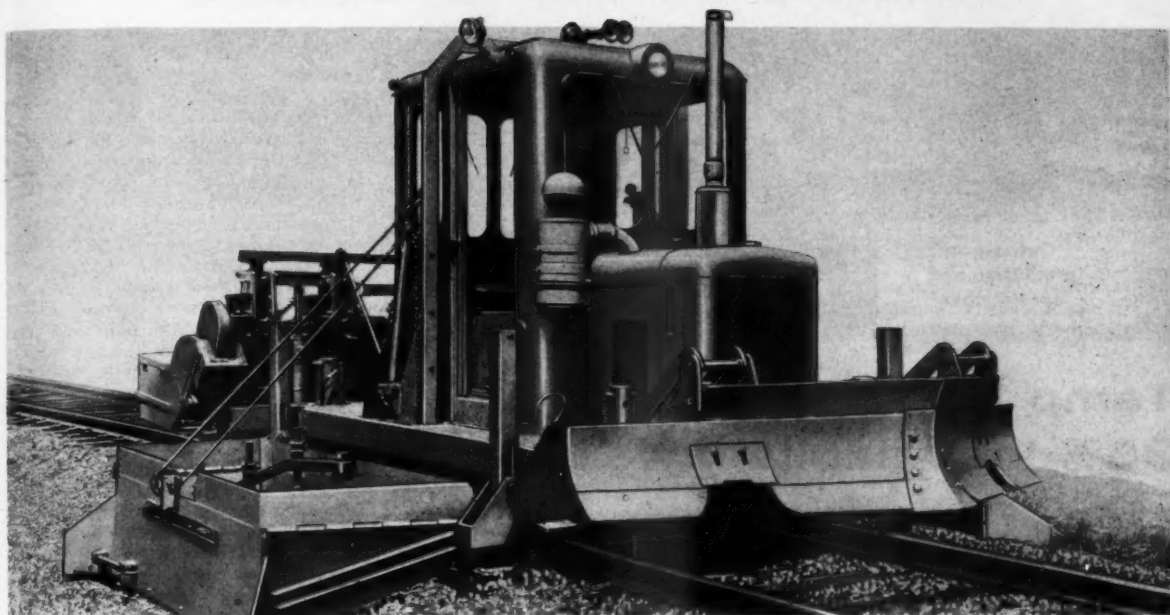
Iowa, later being transferred to Sioux City, Iowa. Mr. Geelhart was further promoted to division engineer at Miles City, Mont., in 1956 and assistant engineer at Seattle, Wash., in 1958, the position he held at the time of his recent promotion.

James W. Winger, 34, who was recently promoted to division engineer on the Baltimore & Ohio at Cincinnati, Ohio (RT&S, Oct., p. 10), was born at Indiana, Pa., and graduated from Pennsylvania State University in 1951 with a Bachelor of Science degree in civil engineering. Mr. Winger entered the service of the B&O in 1951 as a student in the road's technical training program. Two years later he was promoted to assistant to division engineer at Cumberland, Md., being promoted to assistant division engineer at Wheeling, W. Va., in 1954. He was transferred to Connellsville, Pa., two years later and promoted to maintenance engineer, system, in 1957. Mr. Winger was serving in the latter capacity at the time of his recent promotion.

Harold L. Keeler, 35, who was recently promoted to assistant division engineer on the North Western at Boone, Iowa (RT&S, Aug., p. 10), was born at Aberdeen, S. D., and received his higher education at Miami University, Northern State Teachers College and South Dakota State College. He entered the service of the North Western in 1950 as a tapeman at Huron, S. D., being promoted to rodman at Boone the following

SERVING FOR 75 YEARS

with quality maintenance-of-way equipment

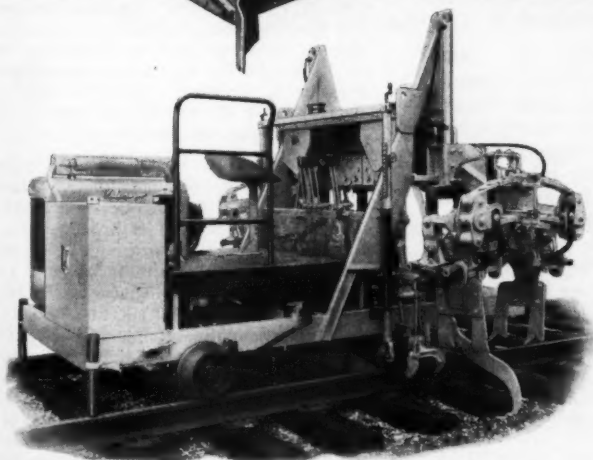


#40 BALLAST EQUALIZER

*with directional plow
and track sweeper*

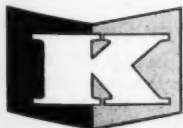
- Ballast boxes operate in either direction, hydraulic vertical or horizontal adjustment.
- Directional plow with attachment to distribute ballast on curves.
- Vacuum power brakes.
- 8 speeds in either direction plus 4-wheel, all-gear drive.
- Full 9' 8" wide track sweeper has mechanical drive and 234 hose sweeper elements.
- Model 53 series General Motors diesel power.

Ask for #40 Ballast Equalizer Bulletin No.
BDS-2 or Handyman Bulletin No. HM-3



HANDYMAN POWER TAMPING JACK

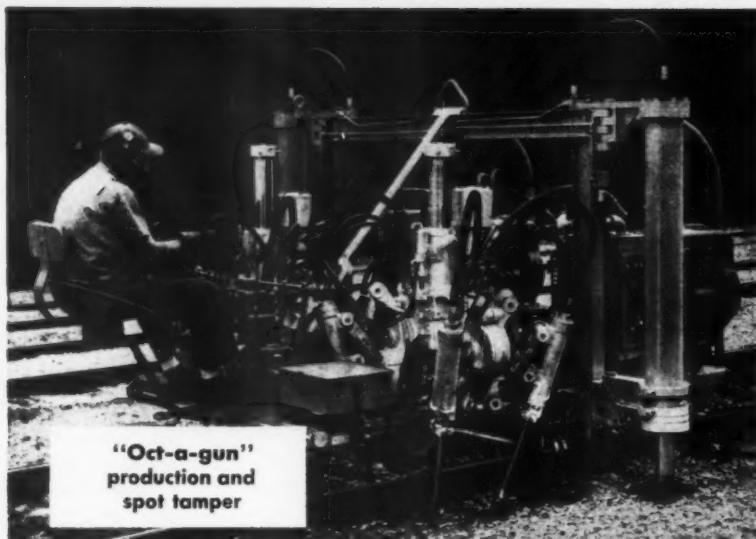
- Fast, powerful hydraulic jacking
- Exclusive, self-adjusting tie nippers
- Four powerful vibratory tamping units
- High performance, low maintenance



KALAMAZOO
MANUFACTURING COMPANY

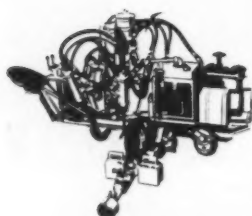
1827 reed st., kalamazoo, mich., U. S. A., cable: velocipede





"Oct-a-gun"
production and
spot tamper

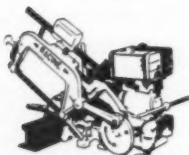
Tamp 300 feet per hour with 35% less capital investment



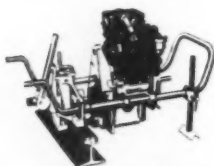
**SINGLE-RAIL
SPOT TAMPER**



UNIT TAMPER



RAIL SAW



RAIL DRILL

Here's a production tamper that out-tamps or equals the normal continuous tamping output of other machines that cost from one-and-a-half to four-times its price. Racine "Oct-a-gun" also jacks the track as it tamps, eliminating the need, time and manpower for a separate track jack.

"Oct-a-gun" tamps one or both ends of tie... stabilizes ballast at honest rate of 180 ties-per-hour. It tamps uniformly at every tie with hydraulic-powered, 1160 high-impact tamping blows per minute. One operator works twin 4-tool heads, tamping as solidly as desired... from directly below the rail base to 18" either side of rails. Integral hydraulic jacks with positive rail-grip and powerful, big-diameter cylinders provide smooth raise with clear sighting. Fast-starting hydraulic motors propel the machine from tie to tie... and move it to-and-from job or switch at 12 mph. Machine is powered by two 18 hp gas engines, can be removed from tracks in three minutes on standard prepared set-off.

Clip and mail the coupon for location where you can see "Oct-a-gun" tamper at work... or check for literature on any Racine machine.



RACINE HYDRAULICS & MACHINERY, INC.
DEPT. A251 RACINE, WIS.

Send literature on: ☐ "Oct-a-gun" tamper ☐ Anchor applicator ☐ Spot tamper ☐ Unit tamper ☐ Rail saw ☐ Rail drill

Where can I see..... (name of machine)

Name..... Title.....

RR or Co.....

Address

City..... State.....

Biographical briefs (cont'd)

year. Mr. Keeler was further promoted to instrumentman there in 1952 and assistant general bridge inspector at Chicago in 1956. He was advanced to assistant engineer at Boone four months later, the position he held at the time of his recent promotion.

Frank H. McGuigan, 46, who was recently promoted to construction engineer of the Missouri Pacific at St. Louis, Mo. (RT&S, Sept., p. 10), graduated from Lehigh University with a Bachelor of Science degree in civil engineering. He entered the service of the MP in 1934 as a chainman in the bridge construction section. Subsequently he served in various capacities in Missouri and Kansas prior to being promoted to assistant engineer at St. Louis. During World War II he was in the U. S. Navy. Mr. McGuigan was further promoted to structural bridge designer in 1949, assistant engineer in 1953 and bridge construction engineer three years later. He was serving in the latter capacity at the time of his recent promotion.

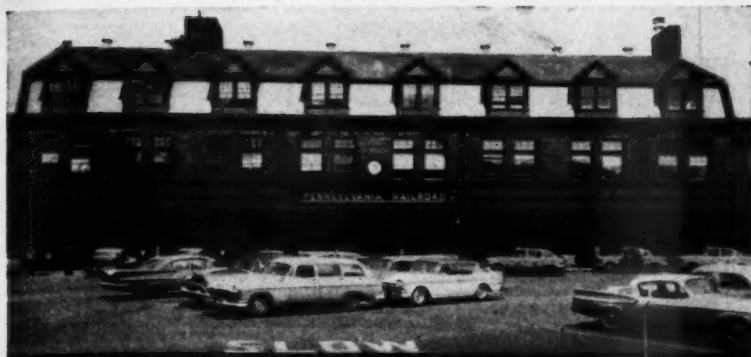
Nicholas C. Kieffer, Jr., 40, who was recently promoted to division engineer of construction on the Louisville & Nashville at Covington, Ky. (RT&S, Sept., p. 10), was born at Birmingham, Ala., and received his higher education at Auburn University. Mr. Kieffer entered the service of the L&N in 1947 as an instrumentman at Mobile, Ala., being promoted to draftsman at Louisville, Ky., the following year. He was further promoted to assistant engineer at Louisville in 1950, assistant supervisor bridges and buildings there in 1952 and assistant division engineer, also at Louisville, in 1953. Mr. Kieffer was appointed assistant engineer in the chief engineer's office in January 1960, the position he held at the time of his recent promotion.

John R. Shafer, 42, who was recently promoted to office engineer of the Union Railroad at East Pittsburgh, Pa. (RT&S, Aug., p. 10), was born at Braddock, Pa., and graduated from Carnegie Institute of Technology in 1957 with a Bachelor of Science degree in civil engineering. He entered the service of the UR in 1940 as a tracer, subsequently serving as blue print boy, junior bridge and building inspector and bridge and building inspector. In February 1945 he joined the U. S. Army, returning to his former position in October 1946. Mr. Shafer was promoted to draftsman in 1947, engineer in 1955 and assistant office engineer in 1957. He was advanced to assistant to chief engineer two years later, the position he held at the time of his recent promotion.

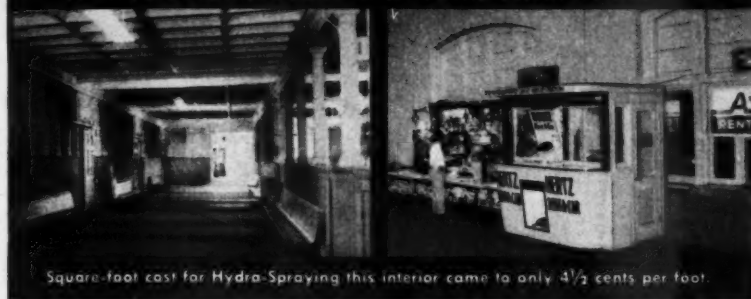
Association news

Mississippi Valley Maintenance of Way Club

The next meeting of the club will be held on January 9 at the usual location, the Ambassador-Kingsway Hotel, 108 N. Kingshighway, St. Louis, Mo. Designated as presidents' night, the meeting will have as (Continued on page 68)



Pennsylvania's Harrisburg Station. Inside—a 103,070 square-foot paint job.



Square-foot cost for Hydra-Spraying this interior came to only 4 1/2 cents per foot.

How GRACO Hydra-Spray cut building painting costs for the Pennsylvania Railroad

When someone cuts painting costs to less than a fourth of what they were seven years ago, you've got to admit that this is a tremendously significant saving. Indeed, it's almost unbelievable!

Yet, that's exactly what the Pennsylvania Railroad did when it recently repainted its Harrisburg, Pa., station (illustrated above) using new *airless* GRACO Hydra-Spray equipment.

The cost? \$4,638.15. The 1953 cost for the same building and the same square footage? \$20,000. Check the company's own report . . . it's reproduced directly to the right.

Moreover, the *airless* method of Hydra-Spraying your paints and other protective coatings provides other big benefits as well:

- It virtually eliminates overspray.
- Allows heavy film build-up.
- Eliminates pin-holing.
- Gives high penetration on rough surfaces and full coverage in recessed areas . . . without excessive solvent reduction.

Ask your GRACO Railway Representative to tell you more. Write or call him today.

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MONTREAL—Ontario, Canada
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R. A. Corley
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SAN FRANCISCO
The Barnes Supply Company
Rm 504, 74 Montgomery Street

TWIN CITIES—St. Paul, Minn.
The Daniel L. O'Brien Supply Company
Endicott-On-Fourth Bldg.

SPECIAL COST REPORT ON STATION PAINTING AT HARRISBURG, PA.

THE PENNSYLVANIA RAILROAD
Philadelphia / March 7, 1960

SUBJECT: Spray painting of interior of passenger station at Harrisburg, Pa. Total coverage, 103,070 sq. ft.

Recently the above subject station was spray painted (with new Graco equipment) by our own forces—one foreman and four painters—during their regular tour of duty 7:00 A.M. to 3:30 P.M. for \$4,638.15.

In the year of 1953 this same station was brush painted for \$20,000. We are unable to say what the size of the force was at that time, but we do know that it was painted during off hours, therefore causing overtime.

BREAKDOWN OF COST

(Labor and Materials to paint 103,070 sq. ft.)

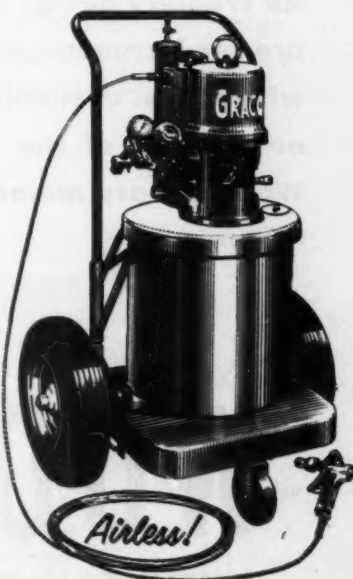
Forces

One foreman and four painters	
January	
160 manhours @ \$3.08 per hr.	\$ 492.80
February	
664 manhours @ \$3.15 per hr.	2,091.60
	\$2,584.40

MATERIALS

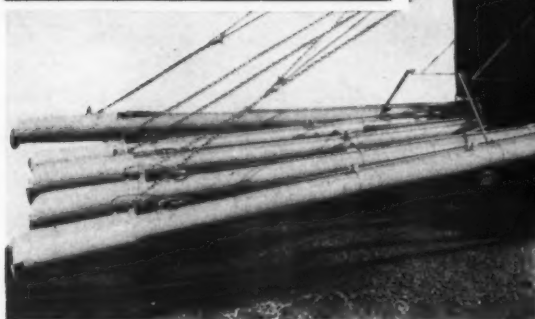
White	\$ 990.00
Seafoam green	472.50
Aspen green	225.00
Bench green enamel	46.00
Varnish	31.25
Diesel fuel oil	49.00
240 meals	240.00
TOTAL	\$4,638.15

Coverage per gal. of paint . . . approx. 270 sq. ft.
Cost per sq. ft. \$0.45



SNOWEEDER!

**DESTROYS VEGETATION ON
ROAD BEDS, EMBANKMENTS
AND DITCHES — QUICKLY
CLEARS SNOW FROM YARDS
AND SWITCHES**



WOOLERY put its first weed burner in service on a major road in 1925. Today's advanced design, the model C.O.E., embodies every refinement made in more than 30 years of continuous improvement.

All Woolery design changes are for increased efficiency with no loss of simplicity . . . no sacrifice of the famous Woolery easy maintenance features.

THE FAMOUS WOOLERY MODEL C.O.E.

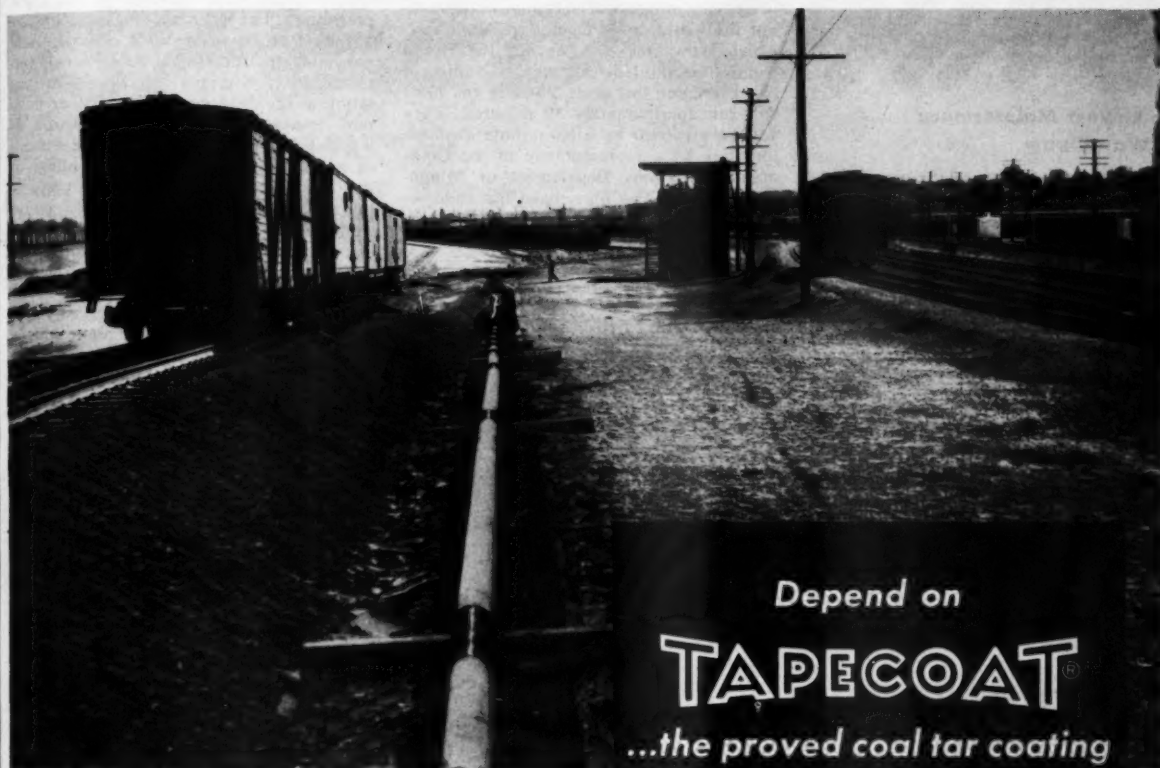
- **TORQUE CONVERTER** drive on propelling engine.
- **ELECTRIC IGNITION** to all five firesist alloy steel burner heads. Burners can be used individually or all five together. Outer burners can be manipulated from cab while machine is in operation.
- **ALL STEEL CAB.** Doors fasten half-open to deflect heat and scoop in air.
- **TWO BRAKING SYSTEMS.** Power for service, manual for parking or emergency.
- **CHOICE OF ENGINE MAKES . . .** Also available in 3-burner, 2-burner or 1-burner models.

Literature and specifications on request.
Also manufacturers of Woolery Tie Cutters, Tie End Removers, Bolt Tighteners, Spike Drivers, Track Tool Transporters, Motor Cars and Joint Oilers.

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Joints on line are TAPECOATed to assure protection against corrosion equivalent to mill coating on the pipe.

Depend on
TAPECOAT
...the proved coal tar coating
in handy tape form

You take no chances when you specify TAPECOAT coal tar coating to protect pipe, pipe joints, fittings, couplings, tanks, tie rods, conduit and cable.

Since 1941, TAPECOAT has proved its superiority in resisting moisture, acids, alkalis, chemical fumes and other severe corrosive and abrasive conditions.

For example, an eastern railroad had a problem with air lines buried in cinders because of frequent failures due to severe corrosive attack. In 1948, this company turned to TAPECOAT and the lines have remained in perfect condition ever since.

TAPECOAT comes in rolls of 2", 3", 4", 6", 18" and 24" widths. It is

easy to apply with the use of a torch. No skilled help is required.

A TAPECOAT sales and service engineer is always available to help you on your specific corrosion problem. Write for details today.



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Representatives in Principal Cities

Manufactured and distributed in Canada by The Tapecoat Company of Canada, Ltd., 25 Haas Road, Rexdale, Ontario

Association news (cont'd)

its principal speaker A. K. Heineman, president of the Alton & Southern. The social hour will commence at 5:30 pm, with dinner starting at 6:30.

Northwest Maintenance of Way Club

The January meeting of the club will be held on the 26th at the usual location, Coleman's Cafe, 2239 Ford Parkway, St. Paul. The program will be presented by the

Minnesota Mining & Manufacturing Co. and will consist of two motion pictures concerning communism. The films are entitled "Communism on the Map," which depicts the progress of communism throughout the world, and "Operation Abolition," which shows the riots against the House Committee on Un-American Activities in San Francisco last year. Each of the films will run approximately 30 minutes. They will be preceded by a ten-minute explanatory talk by a representative of the Community Relations Department of Minnesota Mining. The films have the endorsement of J. Edgar Hoover, head of the Federal Bureau of Investigation.

Bridge & Building Association

A meeting of the Executive Committee of this association was held at St. Louis on December 5, with President H. D. Curie presiding. The principal business on the agenda was the selection of chairmen and personnel for the special subjects committees that are to prepare reports for presentation at the 1961 convention. Other business transacted included a discussion of ways and means of stimulating the amount of advertising space in the Proceedings of the 1960 convention, now under preparation. The next meeting of the Executive Committee will be held during the AREA convention next March. The exact date will be established and announced by Mr. Curie.

As usual, the 1961 annual convention of the Bridge & Building Association will be held concurrently with that of the Roadmasters' Association. The meetings will be held at the Conrad Hilton Hotel, Chicago, September 18-20.

Roadmasters' Association

Under the direction of President E. F. Snyder, the Executive Committee of the Roadmasters' Association met at the Chicago Engineers' Club on December 5. Chairmen and personnel were selected for the special subjects committees that will prepare reports for presentation at the 1961 convention. There are only five such committees this year, the objective being to allow more time on the program for special features. The Executive Committee also discussed other matters including the chairmen and personnel of the association's three standing committees. The next meeting of the Executive Committee will be held at Chicago on March 6, a day in advance of the opening of the AREA convention.

The 1961 convention of the Roadmasters' Association will, as usual, be held concurrently with that of the Bridge & Building Association. The place is the Conrad Hilton Hotel, Chicago. The dates: September 18-20.

American Railway Engineering Association

A number of standing committees have scheduled meetings to be held in January. These include:

Buildings, January 19-20, Sheraton Charles Hotel, New Orleans, La., including inspection of the city's harbor facilities; Wood Bridges and Trestles, January 10, AAR Research Center, Chicago; Masonry, January 12-13, Hotel Peabody, Memphis, Tenn., including an inspection trip to the prestressed concrete casting yard of the American-Marietta Company; Yards and Terminals, January 23, Netherland-Hilton Hotel, Cincinnati, Ohio; Economics of Railway Labor, January 9, St. Louis, Mo.

Neal D. Howard, executive secretary of the association, has announced that physical arrangements for the 1961 annual meeting are progressing rapidly. The meeting will be held on March 7-9 at McCormick Place, Chicago's new lakeside exposition center. In addition to the regular committee reports, the tentative program for the business sessions lists 17 special features.

On the road* to lower maintenance costs



with PERMALI Insulated Rail Joints

Tough, durable Permali, the moisture-resisting laminate makes insulated joints that reduce costs . . . improve efficiency . . . and here's why . . .

- Signal failures due to insulation breakdown are virtually eliminated—there are no continuous metal parts.
- Installation is quick and simple—only 3 insulating parts.
- Permali joints—even compromise joints—are available for nearly any rail section—shipment usually in 4 to 6 weeks.
- Economical Permali joints are conveniently unit-packed in individual cartons.

Tell us your rail sections and we will send more information with drawings and prices.

*On test by over 20 major U. S. railroads, Permali Joints—more than 2 million of them—are in daily use throughout the world.



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P. O. Box 718, Mt. Pleasant, Pa.

Telephone: Kimball 7-2353 TWX: Mt. Pleasant, Pa. 161

Also available through associated companies in Canada, England, France and Australia.

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SPEED SWING

MODEL 442

Mechanizes road crossing repairs.

Virtually eliminates hand labor.

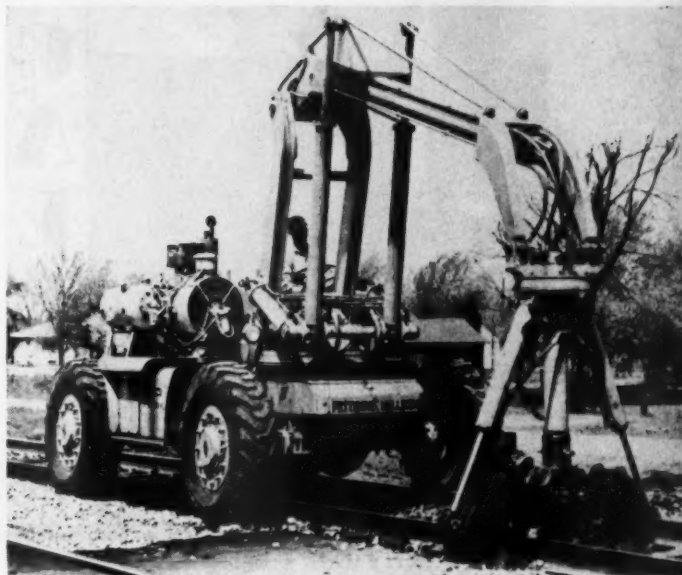
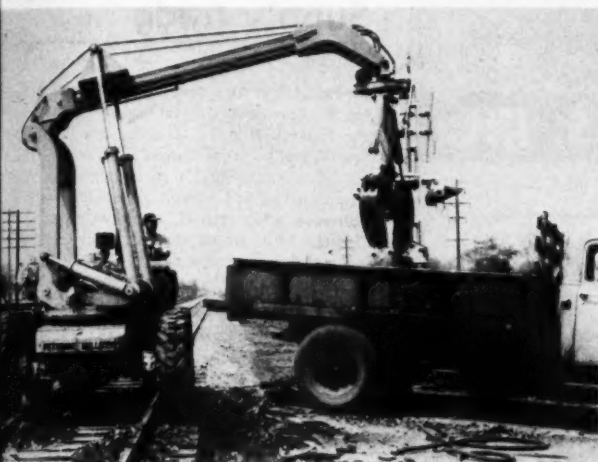
Doubles production.

This is accomplished with 2 quick change hydraulically operated clamshell buckets.

8" wide, cribbing bucket removes material between ties and from under rails.

18" wide, $\frac{3}{8}$ cu. yd. digging bucket.

42" wide snap on lips increases capacity to $\frac{3}{4}$ cu. yd.



FEATURES

180° boom swing.

360° hydraulic swivel for full control of bucket positioning.

9½' forward and backward boom movement.

85 cu. ft. Gyro-Flo Ingersoll Rand compressor with machine engine power take off. (Optional)

Specially designed rear axle leaf spring suspension permits full axle oscillation when crossing rails.

Power shift transmission—torque converter—4-wheel drive, planetary axles—4-wheel power steer—4-wheel power brakes.

G.M.C. 3-71 Diesel engine.

10,000 lb. capacity.



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**80 Years of Service
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**DITCH
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TRENCHER**

The measure of Success

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COMPARE

SIZE: DIGS FROM 4" TO 16" WIDE AND UP TO 6' DEEP

COSTS: AS LITTLE AS 2c PER FOOT!

ABILITY: JOB PROVEN!

LIFE: AS HIGH AS 1/2 MILLION FEET!

EASE OF OPERATION:

See a demonstration!

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**CUTS
RAILROAD
MATERIALS
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TIME & COST!**

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TEALE "200" CRANE

High performance "200" uses less bed space, weighs less . . . but lifts 3,750 lbs. (at 8'), 2,500 lbs. (at 16'), and 1,250 lbs. with hydraulic boom extended 28' out! Fits any truck 5,500 lbs. and up, in 14-17-inches of bed space! Available with fibre-glass basket and personnel platform with platform controls!



P.O. Box 605 Omaha, Nebraska

LARGER CAPACITY CRANES AVAILABLE

Association news (cont'd)

each under the sponsorship of one of the technical committees.

Mr. Howard also announced that advance registration will commence on March 6 at McCormick Place concurrent with the opening of the exhibit sponsored by the National Railway Appliances Association which also will be held at the exposition center. For the convenience of those attending the annual meeting and the exhibit, the NRAA will provide shuttle bus service between the Conrad Hilton Hotel, the convention hotel headquarters, and McCormick Place.

An innovation in the entertainment provided for wives accompanying their husbands to the meeting will be a banquet at the new exposition center. The banquet will be held in the VIP room simultaneously with the association's annual luncheon which will be held in the banquet room.

Supply trade news

AMERICAN BRAKE SHOE COMPANY—Charles P. Corrigan, district sales manager for the Eastern Region, Railroad Products Division, has been promoted to sales manager for the Central Region of the division, with headquarters at Chicago. He succeeds R. L. Robinson who retired, effective December 1, after 32 years of service. Mr. Corrigan is a graduate of Princeton University and joined ABS in 1939 as a buyer.

BUCYRUS-ERIE COMPANY—Pacific Railroad Sales, San Francisco, Calif., has been appointed a crane-excavator distributor. The company will serve the railroad market exclusively in northern California.

A. M. BYERS COMPANY—George B. Coffey, Chicago division manager, has been promoted to central regional manager, with headquarters at Chicago, according to an announcement by V. C. Lawrence, general manager of sales.

CHIPMAN CHEMICAL COMPANY, INC.—E. J. Schlaphoff has been promoted to engineer in charge of railroad spray equipment, with headquarters at Chicago. In his new position Mr. Schlaphoff will supervise the company's railroad spray equipment throughout the country and will also be responsible for training personnel in the operation of the equipment. He attended the University of Nebraska and has been with Chipman Chemical for three years. The announcement states that Mr. Schlaphoff has had wide experience in weed control, including service as a municipal weed control supervisor and as a designer and manufacturer of spray equipment. Also, that he is the designer of the first hydraulically controlled double-track contour spray boom.

JOHNSON RUBBER COMPANY—This company has announced the establishment of a Railroad Sales Division to handle the marketing, sales promotion and research and development of all of its railroad products, including VulcaBond rail joints. Richard

PENNSYLVANIA COMPANY.
OPERATING
Chicago Railway, Erie & Pittsburgh Railroad,
Public Railway, Cleveland & Pitt-
sburg Railroad and

Port Wayne & Chicago
 Railroad, North-Western
 Railroad, Jeffersonville, Madison & Indianapolis
 Railroad, Indianapolis & Vincennes Railroad.

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 Pittsburgh, Pa. 11/11/1901

Order No. 9749
151

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1851
D. A. Frampton

GENERAL PURCHASING AGENT
Pittsburgh, Pa. 4/19 1890

Order No. 9751
D. A. Hampton

Please furnish this Company with the following articles and
SEND INVOICE DIRECT TO MY ADDRESS.

200 lb Pine white oak plank 2 1/2 in. thick
100 lb Pine from cotton wood
Plank good to have
Plank do not lay it

Please furnish this Company with the following
INVOICE DIRECT TO MY ADDRESS.

450,000 ft. B.M. white Oak plank 2 1/2 in, the
four good corners, Round timber for four sides wood
Shakes, Large or small, Plank to be not less than
8 nor more than 12 in. wide and not less
different lengths are not to be mixed in
of planks to be 12 ft. length and some
boards or 24 feet. Delivering in lots
at intervals of one and a half months
and we do not care to have it shipped
in less than 25 to 50 thousand ft. lots
at destination. 8 per 16.00 for
Care & Co. lumber

No charge allowed for Orange or Packages.

MARK Ship by
Mark
Care
At

and oblige

M. L.

READ INSTRUCTIONS ON THE BACK

One of many lumber
purchase order memoirs
issued by the
Pennsylvania Railroad
to D. A. Frampton ...
dated November 19, 1890



Many years have passed . . . methods, procedures and economics have changed through various administrations and countless emergencies. This we must accept. But of much greater significance is the degree of good will and confidence shown us today as in the past by these outstanding railway systems.

We salute the Pennsylvania organization and its thousands of experienced, loyal employees on this, our Golden Anniversary year.

President

D. B. FRAMPTON & COMPANY

Forest Products

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The VAN-AIR DRYER *not only* extracts condensed water from compressed air (which stops freezing of air lines during winter temperatures) — *much more important* it intercepts residual vapors, acid fumes and microscopic solids which flow downstream from reservoir. By reducing these elusive elements the Dryer prevents the incessant corrosion or varnishing of internal metal surfaces exposed to the flow of air.

The VAN-AIR needs little space, is automatic, requires no heat or power—never needs regeneration. It delivers air dry, pure, non-toxic—and operates at the very nominal cost of

LESS THAN 1-CENT per 18,000 CU. FT.

ENGINEERS! Look into the sizeable savings in maintenance costs and parts replacements now practicable with Van-conditioned air. Ask for brochure which explains the economical Van-Air method—tested, proven and used in many hundreds of industrial applications.

Built in 35 capacities there is a Van-Air Dryer properly rated to treat any volume of compressor output—from total air for largest yard or shop operation down to minimal air for brake testing, remote tools, spraying units, etc. Ask for details.

VAN PRODUCTS CO. • MFRS.

5901 SWANVILLE ROAD, ERIE, PA.

Supply trade news (cont'd)

E. Morrison, sales engineer, Mechanical Division, Chicago, has been appointed head of the new division with the title of sales manager, according to an announcement by **E. W. Wright**, sales director for Johnson Rubber. Mr. Morrison will have offices in the company's main office at Middlefield, Ohio.

KOEHRING COMPANY—**E. J. Goes**, publicity manager in charge of shows, conventions, exhibits and trade association work, has retired, effective December 31, after 47 years of service. Mr. Goes' duties will be assumed by **Martin B. Jaeger**, advertising manager.

NALCO CHEMICAL COMPANY — **David M. Jacks** and **Thomas G. Cocks** have been appointed vice presidents of Nalco, each with headquarters at Chicago. Mr. Jacks most recently has been vice president and general manager of the company's Texas subsidiary, Visco Products Company. He has been with Nalco for 22 years. Prior to his new position, Mr. Cocks was district manager of the Southeastern District, Industrial Division, at Jacksonville, Fla. He has been with the company for 23 years.

POOR & CO.—This company has acquired a majority interest in **Mobilweld, Inc.**, according to a recent announcement. Mobilweld is the inventor and developer of a rail welding process that can be moved from

one site to another or operated at a fixed location. Headquarters of Mobilweld will be located at 80 E. Jackson Blvd., Chicago.

SPERRY PRODUCTS COMPANY—**Robert C. Main** has been appointed to the newly created position of manager of engineering of this company, which is a division of Howe Sound Company. Mr. Main was formerly the engineering manager of the Missiles and Space Systems Division of United Aircraft.

SPRAY PRODUCTS CORPORATION—**Richard H. Henry** has been appointed vice president and director of export. He will be responsible for the development of all export business for the company.

UNION SWITCH & SIGNAL—**W. G. Kendall**, sales engineer, railway sales, at the New York district office, has been transferred to the Chicago district office of this company, which is a division of Westinghouse Air Brake Company. **R. H. Tomlinson**, sales engineer at the Pittsburgh (Pa.) district office, has been transferred to the New York district office.

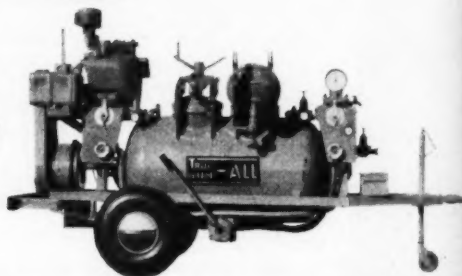
Obituary

Fred L. Eckert, railroad sales representative of Schramm, Inc., died on December 5 after a month's illness.

Neely A. Howell, district sales manager at Chicago for the Unit Rail Anchor Corporation, died suddenly on December 10.



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True Gun-All

Whether you're grouting tunnels, bridge abutments or underpasses; wet sand blasting, or tuck planing, the True Gun-All pneumatic concrete machine will do the job quickly, efficiently and economically. You always get a uniform mix with the correct water-cement ratio. Needs only a small crew to operate.

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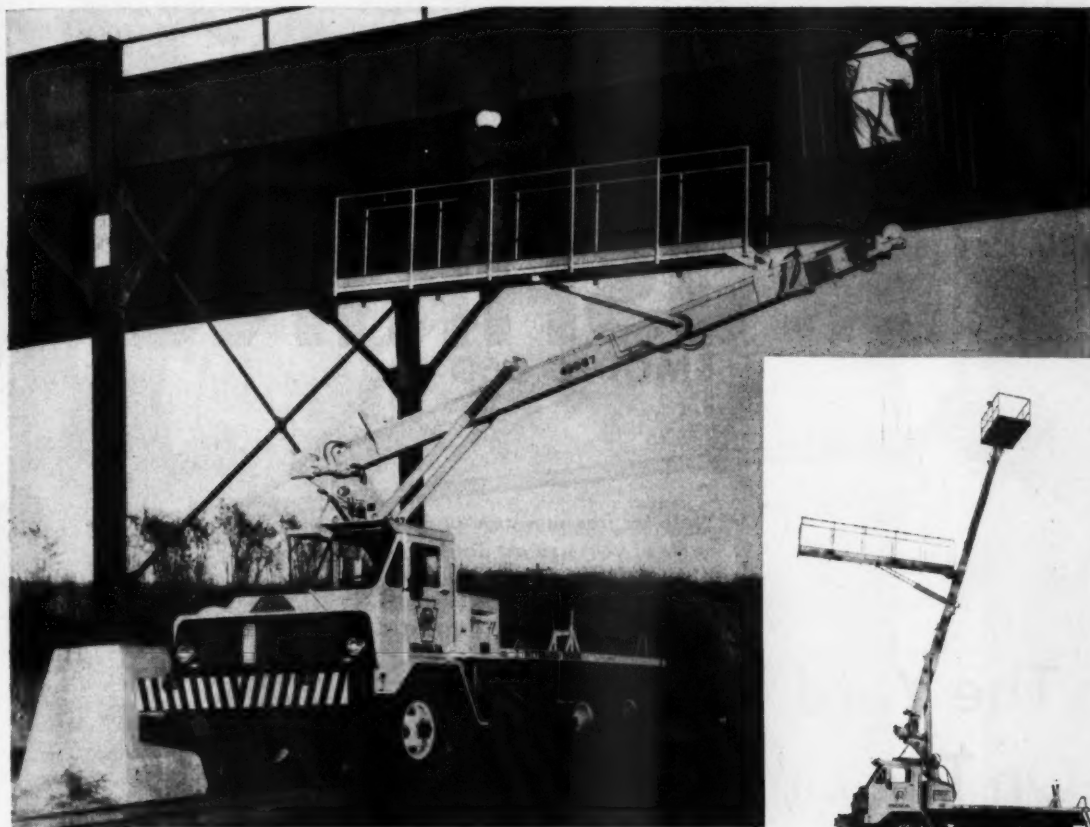
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a division of
DETROIT TOOL ENGINEERING CO.

P. O. Box 232/Lebanon, Missouri

Elliott and RAILROAD CARRIER

Saves Time, Money on Railroad Maintenance



Aerial platform extends 45 feet. Can be controlled from platform or ground.



Elliott units put work crews on the job in minutes. Up to 55 M.P.H. on highway or tracks.

Elliott units approved by Pennsylvania Railroad for Maintenance Modernization

Elliott equipment makes high work a snap and gives it a safety factor never before realized. Recently, when the Pennsylvania set out to streamline and modernize its B and B program, Elliott equipment was included in their list of specifications. Elliott Railroad Carriers give the work force mobility with rail-highway equipment. When you add the Elliott Hi-Reach, you have general-purpose hydraulic equipment consisting of an aerial work platform, a derrick and a catwalk. Elliott equipment saves manpower and money . . . on railroad time.



Elliott Hi-Reach equipment helps get things done safer, faster, and saves time, money and manpower. Please feel free to write us for more information.

Elliott

MANUFACTURING COMPANY

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Maintenance-Is It Costing Too Much?

Are right-of-way brush problems getting out of hand?
Is the cost of maintenance alarmingly high?
Do chemicals leave an unsightly mess, create fire hazards?
Then it's time for a change to Rowco Brushking Model 660!

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BRUSHKING

MODEL 660



Write for free literature and
name of your nearest distributor.

ROWCO Mfg. Co., Inc.

Dept. RT2, 48 Emerald St., Keene, N.H.

In The Yard... OR On The Line **BURRO**

WORK POWER PAYS!

When a BURRO goes to work — in the yard or on the line — it delivers fast, low cost performance. Equipped with bucket, magnet, hook, tongs or dragline bucket, a BURRO is ready and able to do the hundreds of odd jobs railroad work calls for. Fast travel speeds (up to 22 mph.) and heavy draw bar pull enable the BURRO to move itself and a work train or cars to the job in a hurry. Once on the job, a BURRO wastes no time getting the work done. BURRO's work power pays dividends every day it operates.

Write for illustrated BURRO Catalogs

CULLEN-FRIESTEDT CO.

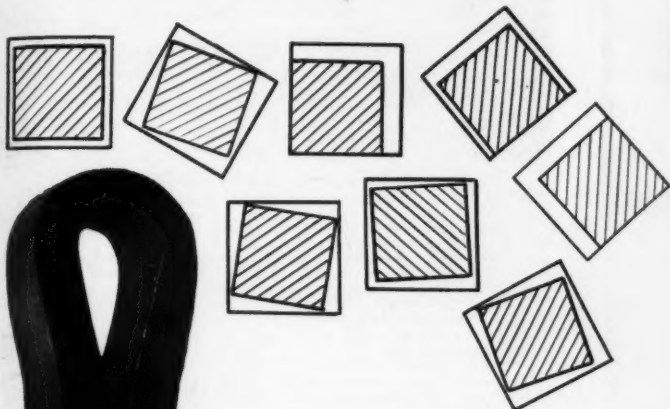
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Represented in Canada by:

SYLVESTER STEEL PRODUCTS CO., LTD.
LINDSAY, ONTARIO



Troubled with loose fit of spikes in tie plate holes? . . . Plate cutting of ties . . . wave in the rail . . . Irregular gage?



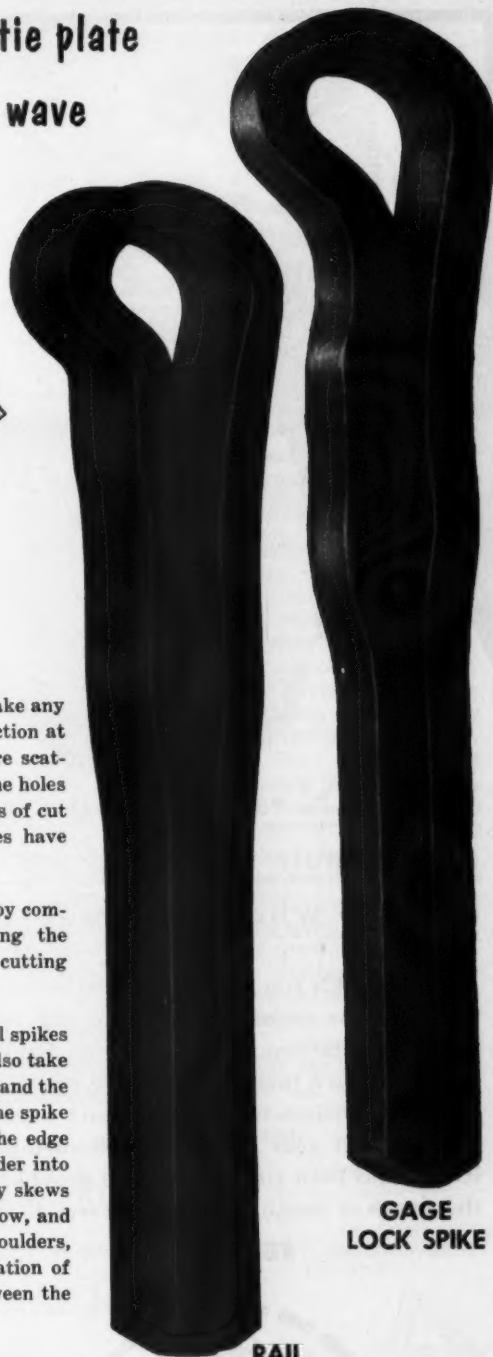
The common $\frac{5}{8}$ " square shank cut spike may take any one of the various positions shown in cross-section at the line spike holes of the tie plate, which are scattered about this page. A reduction in size of the holes will not correct this trouble, as exhaustive tests of cut spikes in the smaller $11/16$ " square lag holes have proved.

Only LOCK SPIKES completely fill the holes by compression of the spread shank—firmly holding the plates to the ties under spring tension. Plate cutting is overcome—Rail is held to gage and line.

Rail Lock Spikes and Gage Lock Spikes are rail spikes as well as plate fastenings. Rail Lock Spikes also take up the play between the width of the rail base and the tie plate shoulders. The slight protrusion on the spike head at the tie plate surface binds against the edge of the rail base and forces the opposite shoulder into contact with the rail base. This action slightly skews the tie plates, as shown in the illustration below, and binds the rail at all four corners of the plate shoulders, as indicated by the arrows. Complete elimination of play in the spike holes of a tie plate and between the shoulders is accomplished.



**TIE PLATE
LOCK SPIKE**

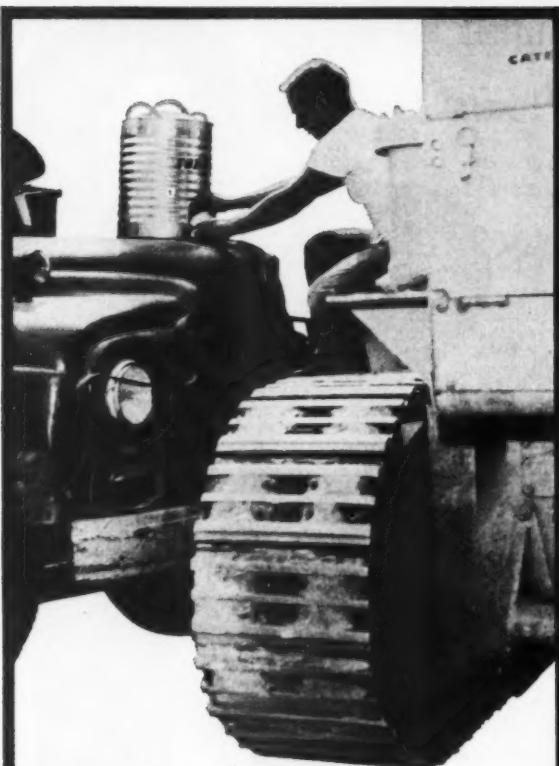


**GAGE
LOCK SPIKE**

**RAIL
LOCK SPIKE**

**BERNUTH,
LEMBCKE CO., INC.**

420 Lexington Avenue
New York 17, N. Y.

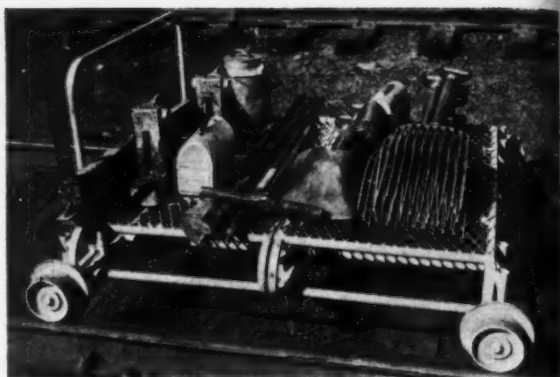


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IGLOO puts Drinking water exactly where you want it

... and WHEN you want it. IGLOO portable water coolers speed up the work and help employee relations, too. Station an IGLOO for every 6 to 8 men and see the results immediately. Select from 23 sizes and models—one will fit your exact needs. Remember, IGLOO has been time-tested and proved on thousands of tough jobs over the world.

Write for catalog. **IGLOO** Memphis 18, Tenn.



EASY-ROLLING FAST MOVER

You can load this handy, easy-rolling NOLAN TOOL and SUPPLY CAR with up to 2000 lbs. of tools, ties, rails and supplies . . . and transport them quickly and safely from truck or bus to the job. Accepted as the standard railway tool and supply car by the leaders!

All tubular high-carbon steel construction for trouble-free heavy-duty service. Car breaks conveniently in the center into two sections for easy handling and transportation. Each section can be used as a truck seat.

The deck is heavy mesh-expanded steel. Removable handle can be used at either end. Ball bearing cast steel wheels.

Platform Size 48" x 45"
Height Above Rail 8"
Weight 140 lbs. complete

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NOLAN TRACK DOLLY ▶

The fast, safe, easy way to transport heavy rails, ties, supplies, tools, rerailers, etc. Tubular high-carbon steel construction. The deck is heavy mesh-expanded steel. Removable handle.

STANDARD DOLLY			
Length	Width	Rail	Weight
50 1/2 in.	15 1/2 in.	6 1/2 in.	88 lbs.
INSPECTOR'S DOLLY			
36 in.	14 in.	6 in.	60 lbs.

THE NOLAN COMPANY, 166 Pennsylvania St., Bowerston, Ohio



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Your Maintenance of Way BUDGET DOLLARS

By Using

SPENO

Rail Grinding - Ballast Cleaning Service

Our contract arrangement for these services obviates necessity for any capital investment on the part of the railroads and protects them as to cost for this type of work.

We have been servicing railroads continuously for over 45 years and have yet to lose a customer.

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We are indeed proud that the Pennsylvania has ordered from us because we know it certifies our trailers as being an "improvement" over the units they formerly used.

YOU can easily find out exactly how our trailers are "better" . . . simply give us a call today, and we'll be on our way tomorrow, to show YOU!

In addition to the Pennsylvania, Atlantic has also supplied Railroad Camp Trailers to such outstanding lines as the B&O, Central RR of New Jersey, Lehigh Valley and others.



Atlantic Railroad Camp Trailers save money on hotel costs . . . travel costs . . . and improve employee morale.

For immediate action, CALL Berlin 1040



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For Over Three-Quarters of a Century 1881-1961**

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CARLISLE, PENNA.

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Test coat a bridge... see what "AZ" can really do

Dearborn's new mobile unit is now available to prove on your own bridge the advantages and economies of NO-OX-ID® "AZ."

Silvery AZ is a one-application, multi-metal coating which gives complete mechanical and chemical protection indefinitely under severest corrosive conditions.

It is made for spray application...penetrates and loosens slab rust and curled paint...adheres well with minimum surface preparation...dries to a firm finish which can be permanently stenciled...averages 60 percent saving over conventional painting.

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READY CARBON
ROUND TRIP
LETTER SET



ROUND TRIP LETTER

to Chief Engineer

DATE January 4, 1961

SUBJECT 1961 Vegetation Control Program

In recent years our chemical control program has been stretched as related to the quantities available, to the point where we are obtaining a "TOPKILL" only. My recommendation is to start a real "CONTROL VEGETATION" program.

With this in mind I would recommend that we apportion the sum of money made available for this work, so that the following procedure may be followed:

1. On areas where vegetation is most dense, apply sufficient chemical to assure a heavy treatment and a root kill.
2. Take the remaining amount of money and use it for liquid "CHEMICAL MOWING" treatment.

I understand that this procedure has been followed with marked success on several railroads. Our method of recent years has failed to give satisfactory control, and in some areas we have even slipped badly on control. If the procedure suggested was followed hereafter it would offer the prospect of giving us far better control in a few years time through a "cycle maintenance program".

SIGNED

John Doe

DEPT:

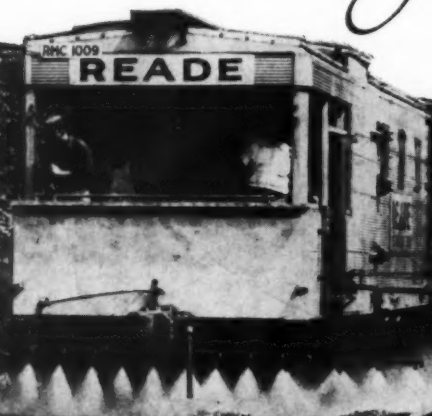
E. Milway

REPLY:

John: This is the type of program you and I discussed with the Reade representative when he was here last. I heartily agree with long range planning such as has been suggested. Contact Reade and arrange for a meeting at the earliest possible opportunity.

I believe we can work out the details for a program of this type that will fit our budget.

JB



READE MANUFACTURING CO.

Jersey City 2, N.J.—Oldfield 3-30

0.
30